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Groins : An Annotated Bibliography

by
J.H. Balsillie
and
R.O. Bruno

MISCELLANEOUS PAPER NO. 1-72
APRIL 1972



U. S. ARMY, CORPS OF ENGINEERS
COASTAL ENGINEERING
RESEARCH CENTER

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ABSTRACT

A groin is a shore protective structure built (usually perpendicular to the shore) to trap littoral drift or to retard erosion of the shore. Considering all types of shore protective structures used by coastal engineers, the groin is one of the most controversial and most difficult to design. Because the functional and structural guidelines for design are incomplete, many groin installations fail to fulfill their intended purpose. CERC supports a continuing research program devoted to gaining a better understanding of groins. This bibliography evolved from the groin research program.

About 460 articles published since 1900 on groins and groin-type structures are presented in this bibliography. Annotations accompany each bibliographic entry where possible. Indexes of authors, titles, and subjects are included to aid the researcher. Unavailable literature such as foreign articles, although not annotated, are included as entries in both the annotated section and the indexes.

FOREWORD

This bibliography was compiled by J. H. Balsillie and R. O. Bruno under the general supervision of D. W. Berg, Chief, Evaluation Branch, and G. M. Watts, Chief, Engineering Development Division.

Indexes of the bibliography were automated by the use of a computer. Programs used were prepared by M. Keplinger of the National Bureau of Standards and B. R. Sims of the Coastal Engineering Research Center. Mr. Sims adapted these programs specifically for the compilation of this bibliography.

At the time of publication, Lieutenant Colonel Don S. McCoy was Director of CERC; Thorndike Saville, Jr. was Technical Director.

NOTE: Comments on this bibliography are invited. Readers who find omissions or errors are urged to submit their suggestions.

This report is published under authority of Public Law 166, 79th Congress, approved July 31, 1945, as supplemented by Public Law 172, 88th Congress, approved November 7, 1963.

CONTENTS

	Page No.
INTRODUCTION:	v.
USE OF BIBLIOGRAPHY:	v.
ANNOTATED BIBLIOGRAPHY:	1
AUTHOR INDEX:	127
TITLE INDEX:	143
KEY WORDS AND CATEGORIES:	199
DEFINITIONS OF KEY WORDS:	200
KEY WORD INDEX:	205

INTRODUCTION

Groins are shore protection structures, usually built perpendicular to the shore, that function to trap littoral drift or retard erosion of the shore. This annotated bibliography is intended to provide a ready source of published information on groins and groin-like structures.

The Coastal Engineering Research Center (CERC) and its predecessor, the Beach Erosion Board, have for many years been investigating groins both in the field and laboratory. During the past several years, the emphasis placed on investigation of groins has increased. As a result, a study is now underway to determine functional and structural behavior of groins to improve guidelines and criteria for use in their design.

As part of this investigation, the available literature was reviewed. It became apparent that the results of this review would assist others; thus, this bibliography has been compiled and published.

463 articles, published since 1900, on groins and groin-like structures are referenced by this bibliography. Appropriate annotations are provided to assist the investigator. Additionally, cross-referenced indexes for author, title, and subject have been included to facilitate access to the annotated section.

USE OF BIBLIOGRAPHY

Each entry of the bibliography consists of a code number, title, author, source, annotation, and key word list. These entries appear in consecutive order of code numbers, the code number depending in part upon the year and month of publication, as:

4	2	0	4	G	R	0	0	2
Year: 1942		Month: April		Serial Number				

Where the year or month of publication cannot be determined zeros are substituted.

For articles or reports which have been published the appropriate citation is given. At the end of the source citation, call numbers of those entries held in the CERC Library appear in parentheses.

Annotations are an integral part of this compilation. Even so, many articles, such as foreign and domestic articles that were unavailable to the authors or untranslated foreign articles have not been annotated. In some cases, the titles of foreign articles, have been translated to indicate the content of the article. U. S. Congress House Documents have not been annotated because of their similarity of

text, large number, and easy availability. All of this literature, however, is referenced in the annotated bibliography in correct sequence, and in the indexes under the appropriate headings. Notation for articles not annotated which appear in the indexes is as follows:

NA - BEACH EROSION AT SANTA BARBARA CALIFORNIA

3803GR0001

Special utility of the bibliography lies in its indexes. The author index is an alphabetical listing; the title index is an alphabetical listing of words taken out of context of the titles. To provide a subject index, key words were chosen; all articles were keyed to this listing. Before using the subject index the researcher should refer to the key-word list (page 199) to choose the subjects of interest.

In most cases the meanings of the key words are straightforward. However, to clarify any confusion that may result, a list of definitions for the key words follows the key word list (page 200).

"One Aspect of the Dynamics of a Coast
Partly Protected by a Row of Groynes"
Bakker, W. T., Unpublished Manuscript.
(TC337 .B168)

0000GR0001

A mathematical theory is given about phenomena caused by groin construction. Onshore and offshore transport are considered, but not the influence of wave refraction and diffraction. Effects of groins found in this study are: (1) in the middle of the protected part of the coast the same processes occur as without groins, but slower; (2) there are edge effects at the ends of a system where much more accretion and erosion occur than without groins; and (3) the rate of effect of the system depends upon the spacing of the groins.

Key Words - Theory/Erosion/Accretion/System/Transport-normal/

"The Coastal Dynamics of Sand Waves and the
Influence of Breakwaters and Groynes"
Bakker, W. T., Unpublished Manuscript.
pp. 1-7. (V.F. 3249-a BAK)

0000GR0002

At a coastline where littoral transport by waves prevails, progressive sand waves can exist, if there is a periodical varying disturbance at one point on the coast and the coastline is at rest at more than half a wavelength distance. These sand waves (or mega-ripples) move from the point of disturbance to the part of the coastline that is at rest, independent of the direction of the littoral transport. Wavelength increases with the period, but the velocity of propagation decreases. A groin reflects a part of the sand wave. The amplitude of the sand wave near the groin on the side of the disturbance increases; a decrease occurs on the other side of the groin.

Key Words - Theory/Impermeable/Erosion/Accretion/

"Influence of Protective Works on the Erosion
of the West Coast of Sylt, North Sea Coast of
Germany"
Fischer, O., Translation, 12 pp. (TC273 .F9)

0000GR0003

Measurements of the beach on the west coast of Sylt showed that groins and other existing protective structures were independent of subsequent successions of accretion and erosion. The author proposes that original studies maintained over a short period of time were applied to a long period and did not constitute a proper basis for conclusions for beach protection.

"Model Tests of Beach Break at the End of
Stabilized Coastal Beaches (Lee-Erosion)"
Hansen, W., Proceedings of the Testing
Institute of Hannover, Hannover, Germany,
No. 10, pp. 86-119.

0000GR0004

Key Words - Not Annotated/

"The Wosenitz Precast Permeable Groin"
Wosenitz, W. B., The Permagroin Company,
Inc., Dania, Florida.

0000GR0005

This brochure states that the Wosenitz concrete permeable groin, precast with steel reinforcing rods, is specifically designed to assist in building up beaches to a gradual energy-absorbing slope which is the natural method of controlling erosion. Field examples are provided.

Key Words - Wosenitz/Concrete/Permeable/Steel/Piling/Structural-
design/Const-procedure/Accretion/Field/Erosion/
S. Atlantic/1965-1969/Patent/

"The Budd Horizontally Permeable Groin
System for Beach Erosion Control and
Rebuilding Sand Beaches"
Anonymous, E. & E. Associates, Venice,
Florida, 8 pp. (Brochure)

0000GR0006

Brochure presents photographic coverage of Budd groins constructed in Florida, and shows their effects.

Key Words - Concrete/Budd/Permeable/Field/Photographic/System/
Accretion/S. Atlantic/1960-1964/1965-1969/

"On the Length and the Internal Structure
of Seashore Groins"
Sato, S., Journal of Research, Public Works
Research Institute, Vol. 1, No. 4.

0000GR0007

Key Words - Not Annotated/

"The Principle of Increasing Permeability in Groin Construction"
Wood, S. M., A Treatise on a Modern Method of Protecting Waterfront Property, Lake Bluff, Illinois, 3 pp. (TC330 .W879)

0000GR0008

Author gives an introduction to use of groins. He says that the best groin design is that of increasing permeability seaward.

Key Words - Permeable/Misc-plan/Theory/

"Man Against the Sea: A Guide to Erosion Control"
Anonymous, Makepeace Wood, Inc., The Islander Pub. Co., Anna Maria, Florida. (Brochure) (TC330 W879)

0000GR0009

Structural design of S. M. Wood permeable groins is presented in this company brochure. Photographic coverage of various sites where Wood groins have been constructed is given.

Key Words - S. M. Wood/Permeable/Structural-design/S. Atlantic/
Misc-plan/Erosion/Accretion/

"The Protection and Improvement of Foreshores by the Utilization of Tidal and Wave Action"
Allanson-Winn, R. G., Transactions of the American Society of Civil Engineers, Vol. 50, June, 1903, pp. 66-94

0306GR0001

Case groins, constructed of timber, with a long, low design, and economical to build are discussed relative to groins of other designs. A field study is presented in favor of Case groins where the author states that an analogy of small obstructions (Case groins) and the multiplication of small results gradually brings about desired beach buildup.

Key Words - Timber/Long/Low/Economics/Europe/High/Scour/Erosion/
Accretion/Field/Case/Misc-plan/1900-1949/Impermeable/
System/Structural-design/

"Coast Erosion and Foreshore Protection"

0800GR0001

Owens, J. S., Case, G. O., Chapter 11,
St. Bride's Press, London, 1908.

Constructional details of various types of groins, jetties, sea-walls, and bulkheads are given. Details about spacing, height, and desired effect of groins are discussed briefly.

Key Words - Low/Accretion/Structural-design/

"Coast Erosion and Protection on Long
Island and New Jersey"

1508GR0001

Case, G. O., Engineering News, Engineering,
Chemical & Marine Press Ltd., London, Vol. 74,
No. 10, Sept., 1915, pp. 439-442
(V.F. 1350 8/19/15)

Failures of high groins and vertical bulkheads as coast protection works are discussed. Proper methods of design and construction of low groins which have proved successful and their application to construction in New Jersey and Long Island are presented.

Key Words - N. Atlantic/Long/Low/Concrete/Timber/Structural-design/
Economics/Impermeable/High/

"Coney Island Public Beach and Boardwalk
Improvement"

2300GR0001

Farley, P. P., The Municipal Engineers
Journal, Fourth Quarterly Issue, 1923,
32 pp. (TC345 .N73F2)

As part of the Coney Island Improvement project during the early 1920's a system of high impermeable groins was constructed. The groins were not designed to accumulate sand but rather to retain the sand which was pumped between them, to reduce scour by confining the sand between the high barriers, and to break up the sea in time of storm.

Key Words - N. Atlantic/System/Misc-plan/Artificial-fill/Timber/Piling/
Rubble-mound/High/Long/Impermeable/Scour/Field/Structural-
design/1900-1949/

"Causes of Coast Erosion and Accretion"
Case, G. O., The Surveyor, and Municipal
and County Engineer, London, Vol. 69,
No. 1777, 1926.

2600GR0001

Key Words - Not Annotated/

"Sea Defence: Erosion and Protection on a
Sandy Coast"
Mobbs, S. W., The Surveyor, and Municipal
and County Engineer, London, Dec., 1927.
(V.F. 1339)

2712GR0001

British (1927) methods for the construction of timber and concrete groins and their costs are presented.

Key Words - Europe/Timber/Impermeable/Concrete/Steel/Structural-
design/Economics/1900-1949/Mobbs/Field/

"Tests with Scale Models to Determine the
Effect of Currents and Breakers upon a Sandy
Beach, and the Advantageous Installation of
Groins"
Kressner, B., Bautechnik, Berlin, Vol. 25,
June, 1928. (Translation GC211 .K1)

2806GR0001

A comprehensive research paper. Report deals with experiments concerning existing groin structures found along the German coastline. Groin models were used to experimentally find advantageous construction design. Length, spacing, accretion, leeward erosion due to coastal currents were qualitatively evaluated through experiments.

Key Words - Europe/Experimental/Model/Accretion/Erosion/Impermeable/
Theory/

"Die Buhnenwirkung"
Winkel, R., Die Bautechnik, Berlin, Vol. 6,
No. 27, June, 1928. (V.F. 3100)

2806GR0002

Translated Title: "The Action of Groins"

Key Words - Not Annotated/

"Detail of Concrete Block Used in Groins
Constructed at Montecito, Calif."
Leeds and Barnard, Feb., 1929, Consulting
Engineers, Los Angeles, Calif.
(V.F. 3101)

2902GR0001

Design plans for proposed concrete blocks that were used on the Montecito (Santa Barbara), California, groin project are presented.

Key Words - S. Pacific/Concrete/Geometric-shapes/Impermeable/

"The North Shore Versus Lake Michigan"
Wood, S. M., A Treatise on Methods of
Saving Lake Front Property, Lake Bluff,
Illinois, 1930. (Brochure) (V.F. 3104)

3011GR0001

Book discusses in a non-technical manner the problem of lake front protection as it affects property owners along the North Shore of Lake Michigan. Fully illustrated; the book gives examples of poor groin construction as well as satisfactorily performing groin structures of different design.

Key Words - Permeable/S. M. Wood/High/Impermeable/Timber/Steel/
Short/Accretion/Misc-plan/Rubble-mound/Low/T-groin/
Long/Scour/Erosion/1900-1949/Great Lakes/Field/
Single/System/

"Report of Advisory Board on Beach
Protection, Los Angeles County"
Advisory Board on Beach Erosion,
Dec., 1930, Los Angeles, Calif., 53 pp.

3012GR0001

Views by the Advisory Board are expressed about advantageous structural design of groins so that existing structures be made more effective and gradually build a uniform beach.

Key Words - Timber/Low/Scour/Accretion/Concrete/Steel/Piling/High/
System/Long/Short/Single/Erosion/1900-1949/Structural-
design/

"Report to the Fifteenth International
Congress of Navigation"

3100GR0001

Pala, F., and d'Arrige, A., Fifteenth International
Congress of Navigation, Permanent International
Association of Navigation Congresses, Brussels,
2nd Section - Ocean Navigation, 2nd Question,
No. 79, 1931, 24 pp. (TC5 .In8n)

The theory and purpose of groins, their design, and examples are discussed in this report on coastal erosion and shore protective structures.

Key Words - Impermeable/Accretion/Single/System/Short/Timber/Theory/
Field/Europe/1900-1949/Misc-plan/

"Report to the Fifteenth International
Congress of Navigation"

3100GR0002

Schmidt, R., and Heiser, I., Fifteenth
International Congress of Navigation,
Permanent International Association of
Navigation Congresses, Brussels, 2nd Section -
Ocean Navigation, 2nd Question, No. 73, 1931,
31 pp. (TC5 .In8n)

The theory and purpose of groins, their design, and examples are presented in this report on coastal erosion and shore protection structures.

Key Words - Accretion/Europe/1900-1949/System/Structural-design/
Misc-plan/Const-procedures/Single/Piling/Rubble-mound/
Timber/Impermeable/Erosion/

"Sea Walls and Groins of Steel Sheet piling
Stabilize Miami Beach"

3105GR0001

Taylor, L. B., Engineering News-Record,
McGraw-Hill Pub. Co., Vol. 106, No. 19,
May 1931, pp. 760-762.

This article gives the plans, cost and performance of a groin that was constructed at Miami Beach. The steel groin consisted of Larsen steel sheetpiling.

Key Words - Const-procedure/Economics/Steel/Structural-design/Timber/
Piles/Impermeable/

"Sand Movement and Beach Erosion"
Dent, E. J., Civil Engineering, ASCE,
Vol. 1, No. 9, June, 1931, pp. 821-826.
(V.F. 297)

3106GR0001

Economic and esthetic solutions for problems of shore protection are discussed. High and low groins are discussed in light of the effect desired under specific beach and littoral conditions.

Key Words - High/Long/Single/System/Low/Economics/Misc-plan/N. Atlantic/
1900-1949/

"Fort Fisher, N. C."
U. S. Army, Corps of Engineers, House
Document No. 204, 72d Congress, 1st Session,
Jan., 1932.

3201GR0001

Key Words - House Document/Not Annotated/

"Protection of Coasts Against the Sea, with
or without Preponderating Coastal Drift of
Materials"
Coen-Cagli, M. E., World Ports, American
Shore and Beach Preservation Association,
Vol. 20, No. 4, Feb., 1932, pp. 286-293

3202GR0001

The design and method of construction of groins for the protection of sand and pebble beaches must be preceded by a careful study of the locality and all forces acting on the coast. Groin height, length, the terminal groin, and groin spacing are considered.

Key Words - Misc-plan/Structural-design/Accretion/Erosion/Terminal/
Single/System/Timber/Impermeable/1900-1949/

"Du-Plat-Taylor Adjustable Screw Pile
Groynes"
Anonymous, The Engineer, London, June, 1933,
4 pp. (TC257 .B1 3)

3306GR0001

An adjustable screw pile groin was developed in England. The screw piles, 8 to 10 feet long, are tubular with iron screws cast on to them. The planks are held to the piles by retaining collars.

Slotted arrangement of bolt holes allows the planks to assume a considerable angle with the horizontal in the vertical plane. Advantages of these groins are cheapness, rapidity of construction, and facility of adjustment.

Key Words - Low/Timber/Du-Plat-Taylor/Structural-design/Impermeable/
Adjustable/

"Art of Forming Protective Beaches" 3309GR001
Wood, S. M., U. S. Patent Office, Patent
No. 1,928,473, Sept., 1933, 3 pp.

This patent presents a permeable stone groin design by S. M. Wood.

Key Words - Structural-design/Great Lakes/System/Rubble-mound/Concrete/
Permeable/Impermeable/Scour/Accretion/Patent/

"Groynes" 3400GR0001
Matthews, E. R., Coast Erosion and Protection,
3rd ed., Charles Griffin and Co., Ltd.,
London, 1934, 228 pp. (TC330 .M43)

Two chapters in this text deal with groins. Efficiency and cost of different groin designs as compared to that of Case-groins are given with reference to specific construction projects on the coast of Great Britain. The author gives a three-part presentation dealing with (1) high timber groins, (2) low timber groins, (3) concrete-block groins.

Key Words - Concrete/Timber/Misc-materials/Field/High/Low/Long/
Structural-design/Case/System/1900-1949/Economics/
Piling/Short/Impermeable/Europe/

"Wrightsville Beach, N. C." 3401GR0001
U. S. Army, Corps of Engineers, House Document
No. 218, 73d Congress, 2d Session, Jan., 1934.

Key Words - House Document/Not Annotated/

"Beach Erosion at Galveston, Tex."

3406GR0001

U. S. Army Corps of Engineers, House Document
No. 400, 73d Congress, 2d Session, June, 1934.

Key Words - House Document/Not Annotated/

"Permeable Groins of Concrete Check Beach
Erosion"

3500GR0001

Howard, E. A., Engineering News-Record,
McGraw-Hill Pub. Co., Vol. 114, No. 17,
1935.

Key Words - Not Annotated/

"Beach Erosion at Folly Beach, S. C."

3404GR0001

U. S. Army Corps of Engineers, House Document
No. 156, 74th Congress, 1st Session, Apr.,
1935.

Key Words - House Document/Not Annotated/

"Jetty"

3505GR0001

Wood, S. M., U. S. Patent Office, Patent
No. 2,000,312, May, 1935, 3 pp.

This patent presents a groin design which will provide outwardly increasing permeability. S. M. Wood groin designs are usually for Great Lakes use, but this design is recommended for ocean use.

Key Words - Patent/Structural-design/Permeable/Piling/Concrete/Timber/
Steel/Const-procedure/Erosion/Scour/Accretion/

"Jetty"

3505GR0002

Wood, S. M., U. S. Patent Office, Patent
No. 2,000,311, May, 1935, 4 pp.

An S. M. Wood groin design is presented in this patent. The design utilizes precast concrete units held by piling. Its characteristics also include permeability and use for lakeshore protection.

Key Words - Patent/Structural-design/Concrete/Const-procedure/
Timber/Piling/Steel/Permeable/

"Beach Erosion at Compo Beach, Westport, Conn."
U. S. Army Corps of Engineers, House Document
No. 239, 74th Congress, 1st Session, June, 1935.

3506GR0001

Key Words - House Document/Not Annotated/

"A New Method of Construction in Coast
Erosion Control"
Wood, S. M., Bulletin of the Associated State
Engineering Societies, July, 1935.

3507GR0001

Author discusses the inadequacies of impermeable groins and
promotes the permeable concept for groin design.

Key Words - Concrete/Permeable/Impermeable/Accretion/High/Scour/

"Die Schutzbauten auf der Insel Borkum"
Hibben, B., Bautechnik, Berlin, Vol. 13,
No. 53, Dec., 1935, pp. 691-712. (Translation,
V.F. 2023)

3512GR0001

Construction, performance, maintenance, of various types of groins
and seawalls, and a review of reef and inshore changes at Borkum Island
are presented.

Key Words - Misc-plan/Structural-design/Maintenance/1900-1949/
System/Field/Piling/Timber/Steel/Const-procedure/
Economics/Rubble-mound/Erosion/Accretion/Impermeable/
Permeable/

"Reissue Patent No. 19,786"
Wood, S. M., U. S. Patent Office, Dec. 1935.

3512GR0002

Key Words - Not Annotated/

"Certain Points about Erosion, Costs,
and Measures of Protection" 361GR0001
Beach, L. H., Shore and Beach, American
Shore and Beach Preservation Assoc.,
Vol. IV, No. 1, Jan., 1936, pp. 31-33
(TC330 .Am3)

Advantages of short groins are discussed. Short groins can
always be extended. Permeable groins are held to be effective, but
their cost, it is argued, is not economical.

Key Words - Short/Long/Permeable/Economics/

"Beach Erosion at Jacob Riis Park, Long 3601GR0002
Island, N. Y."
U. S. Army Corps of Engineers, House
Document No. 397, 74th Congress, 2nd
Session, Jan., 1936.

Key Words - House Document/Not Annotated/

"Mesh Jetties" 3602GR0001
Herbest, T. R., Jr., Feb., 1936, The
Consolidated Expanded Metal Company,
Wheeling, West Virginia. (V.F. 66)

Blueprints show design of mesh groins (referred to in article as
jetties) constructed of steel. Permeable groins consist of 9-foot
sections, 10 inches in diameter. The blueprints are pilot plans for
a project at Wheeling, West Virginia.

Key Words - Low/Steel/Permeable/N. Atlantic/1900-1949/Structural-
design/Const-procedure/Misc-materials/Adjustable/

"Round-Table Discussion" 3604GR0001
Anonymous, Shore and Beach, American Shore and
Beach Preservation Assoc., Vol. 4, No. 2,
Apr., 1936, pp. 55-56. (TC330. Am3)

Permeable steel groins are discussed in regard to construction,
abrasion and corrosion, and performance.

Key Words - S. Atlantic/Concrete/Steel/Const-problems/Scour/System/
Permeable/

"Jacob Riis Park"

3604GR0002

Anonymous, Shore and Beach, American
Shore and Beach Preservation Assoc., Vol. 6,
No. 2, Apr., 1936, pp. 64-65. (TC330 .Am3)

A system of 24 groins was constructed, and attached to a bulkhead. The groins have been effective in preventing material changes, but their impounding capacity is practically exhausted. Further steps for beach protection are provided. One of these, groin extension, is evaluated.

Key Words - N. Atlantic/System/Economics/ERosion/1900-1949/

"Galveston Beach Construction"

3604GR0003

Anonymous, Shore and Beach, American
Shore and Beach Preservation Assoc., Vol. 4,
No. 2, Apr., 1936, p. 66. (TC330 .Am3)

Initial plans and costs for a 10-element groin system near Galveston, Texas, are given.

Key Words - Texas Gulf/System/Economics/Misc-plan/

"Some Data on Beach Protection Works"

3605GR0001

Lipp, M. N., Civil Engineering, ASCE, Vol. 6,
No. 5, May, 1936, pp. 291-295.

Describes various types of shore protection works. Deterioration of shore protection works along the Florida East Coast between Miami Beach and Palm Beach is reviewed. Included are granite jetties, bulkheads, and groins made of concrete, steel, and treated and untreated timber.

Key Words - Concrete/Steel/Timber/S. Atlantic/System/Rubble-mound/
Structural-design/

"Participation of Federal Relief Agencies
in Beach Protection Projects"

3607GR0001

Thompson, S. G., Shore and Beach, American
Shore and Beach Preservation Assoc., Vol. 4,
No. 3, July, 1936, pp. 89-92. (TC330 .Am3)

Plans and costs of a groin system are presented for a section of the Georgia coastline.

"Investigations of Steel Sheet Piling"

3607GR0002

Rhodes, R. F., U. S. Army Corps of Engineers,
Savannah District, Report to Beach Erosion
Board, Unpublished, July, 1936, 59 pp.
(TC685 .U5)

Report gives detailed data on the condition of sheet steel piling protection structures, including groins, constructed along the Florida coast. Design criteria and photographic coverage are included.

Key Words - Piling/Steel/S. Atlantic/Photographic/System/Short/High/
Long/Low/Structural-design/Field/Const-problems/
1900-1949/Impermeable/

"California's Beach Erosion and Development Problems"

3610GR0001

Leeds, C. T., Shore and Beach, American Shore
and Beach Preservation Assoc., Vol. 4, No. 4,
Oct., 1936, pp. 162-169. (TC330 .Am3)

Presented is a summary of the types of groins constructed along California's coastline. The author stresses that groin direction should be governed by prevailing wind direction.

Key Words - California/Timber/Short/High/Accretion/Erosion/Steel/Low/
Concrete/Structural-design/Const-problems/Impermeable/

"Construction and Maintenance of the Public Beach at Rockaway Beach, Borough of Queens"

3610GR0002

Steiner, C. T., The Municipal Engineers Journal, Paper 181, Oct., 1936, pp. 107-122.
(V.F. 3079)

To preserve the beach at Rockaway, it was realized that a comprehensive system of defense was necessary. Information gained from studies of the beach indicated that groins should be spaced about the same distance apart as their lengths, and a beach with about one-half this length could be maintained. Construction and design, cost, and success of groins as well as other protective structures are discussed.

Key Words - N. Atlantic/System/1900-1949/Structural-design/
Impermeable/Permeable/Economics/Field/Low/Erosion/
Accretion/Timber/Const-procedure/Const-problems/
Maintenance

"Report of the Foreshore Erosion Board" 3612GR0001
Green, H. J., ed., Dec., 1936, Government
Printer, Melbourne, Australia. (V.F. 1341)

A comprehensive report on the problem of erosion in the vicinity
of Port Phillip, Australia, this paper contains a section on groins
dealing with their purpose, design, and construction.

Key Words - Australia/Accretion/Erosion/Concrete/Timber/Rubble-mound/
Scour/Permeable/Impermeable/Low/1900-1949/

"Beach Erosion at Manasquan Inlet, N. J., 3701GR0001
and Adjacent Beaches"
U. S. Army Corps of Engineers, House Document
No. 71, 75th Congress, 1st Session, Jan.,
1937.

Key Words - House Document/Not Annotated/

"Coast Protection on the North Sea Coasts of 3703GR0001
Holland, France, Belgium and Germany"
van der Burgt, J. H., The Royal Engineers
Journal, The Institution of Royal Engineers,
Chatham, England, Mar., 1937, 13 pp.
(V.F. 1311)

Groins on the North Sea have in the past been built with materials
found close-at-hand and without understanding the purpose served by
each component part of the protective work. Design of existing groins,
and other protective structures, failure of designs, and a design
proposal for groins are presented.

Key Words - Europe/Erosion/Structural-design/Impermeable/Permeable/
Piling/Rubble-mound/Shoaling/Misc-materials/Field/

"Beach Erosion at Hollywood Beach, Fla." 3705GR0001

U. S. Army Corps of Engineers, House Document
No. 253, 75th Congress, 1st Session, May,
1937.

Key Words - House Document/Not Annotated/

"Round-Table Discussion of Shore Problems in
Relation to Recreation" 3710GR0001

Anonymous, Shore and Beach, American Shore
and Beach Preservation Assoc., Vol. 5, No. 4,
Oct., 1937, pp. 129-140. (TC330 .Am3)

Groin construction and effectiveness are presented. A discussion
of permeable groins compared with low groins is given.

Key Words - Texas Gulf/System/Steel/Accretion/Long/Erosion/Permeable/
Impermeable/Low/Piling/

"Jetty" 3711GR0001

Wood, S. M., U. S. Patent Office, Patent
No. 2,099,249, Nov., 1937, 3 pp.

This patent presents an S. M. Wood groin design particularly
adapted for ocean front protection, which offers permeability, and
facilitates easy installation.

Key Words - Patent/Structural-design/Concrete/Timber/Piling/
Permeable/Const-procedure/Scour/Accretion/

"Study of an Artificial Bathing Beach at
Orchard Beach, Pelham Bay, N. Y." 3711GR0002

U. S. Army Corps of Engineers, House
Document No. 450, 75th Congress, 2nd Session,
Nov., 1937.

Key Words - House Document/Not Annotated/

"Report on Beach Erosion at Hollywood Beach,
Florida" 3801GR0001

Anonymous, Shore and Beach, American Shore and
Beach Preservation Assoc., Vol. 6, No. 1,
Jan., 1938, pp. 9-13. (TC330 .Am3)

A short statement giving 1938 conditions of a groin system built in 1927 and 1935 at Hollywood Beach, Florida, is presented with proposed future improvement recommendations and costs.

Key Words - 1900-1949/S. Atlantic/System/Timber/Economics/Steel/Piling/
Structural-design/Misc-plan/Impermeable/

"Report on Erosion at Manasquan Inlet, New Jersey, and Adjacent Beaches" 3801GR0002
Anonymous, Shore and Beach, American Shore and Beach Preservation Assoc., Vol. 6, No. 1, Jan., 1938, pp. 13-18. (TC330 .Am3)

An example of a single steel sheet-pile groin constructed (1933) to check erosion is briefly noted. Recommendations were made for further groin construction.

Key Words - 1900-1949/Erosion/Single/Field/System/Economics/
N. Atlantic/Accretion/Impermeable/

"Beach Erosion at Willoughby Spit, Va." 3801GR0003
U. S. Army Corps of Engineers, House Document No. 482, 75th Congress, 3rd Session, Jan., 1938.

Key Words - House Document/Not Annotated/

"Beach Erosion at Santa Barbara, Calif." 3803GR0001
U. S. Army Corps of Engineers, House Document No. 552, 75th Congress, 3rd Session, Mar., 1938.

Key Words - House Document/Not Annotated/

"Erosion of Our Coastal Frontiers" 3804GR0001
Wood, S. M., Bulletin of the Associated State Engineering Societies, Apr., 1938, 32 pp. (TC330 .W879)

Design criteria and the effects gained are discussed in relation to permeable and impermeable groins. Field examples are given.

Key Words - Impermeable/Permeable/S. M. Wood/S. Atlantic/Great Lakes/
Accretion/Scour/High/Low/Misc-plan/System/Concrete/Timber/
N. Atlantic/Erosion/Long/Short/Theory/Field/

"Shore Protective Work at Winthrop,
Massachusetts"

3806GR0001

Hale, R. K., Civil Engineering, ASCE, Vol. 8,
No. 6, June, 1938, pp. 388-399. (TA1 .C582)

Article describes the seawall and groin system in use at Winthrop, Mass. since 1915. In 1938, neither the timber groins nor the concrete seawall had shown signs of deterioration. Other structures added to the original system since 1915 are described and the estimate advanced that 160,000 sq. ft. of beach area has been added since the construction of protective structures.

Key Words - Timber/Low/Accretion/N. Atlantic/Structural-design/
Field/1900-1949/

"Early Attempts at Inlet Construction on the
Florida East Coast"

3807GR0001

Fineren, W. W., Shore and Beach, American
Shore and Beach Preservation Assoc., Vol. 6,
No. 3, July, 1938, p. 91. (TC330 .Am3)

Writer believes there is insufficient information with respect to the relation of groin length to width and spacing that will lead to permanency of protection, but he believes that in general, groins should be spaced closer than is the general practice. A Florida example is given.

Key Words - S. Atlantic/Short/System/Erosion/Accretion/Rubble-mound/
Misc-plan/Economics/

"Galveston Island Shoreline and the Protection
of Galveston Beach"

3807GR0002

Washington, C. C., Shore and Beach, American
Shore and Beach Preservation Assoc., Vol. 6,
No. 3, July, 1938, pp. 105-108. (TC330 .Am3)

Erosion Board recommendations are given which include groin concentration, length, spacing, design, and cost.

Key Words - Texas Gulf/System/Steel/Low/Economics/Structural-design/
Impermeable/

"Shore Protective Work at Winthrop,
Massachusetts"

3807GR0003

Hale, R. K., Shore and Beach, American Shore and Beach Preservation Assoc., Vol. 6, No. 3, July, 1938, pp. 92-94. (TC330 .Am3)

This article describes the seawall and groin system in use at Winthrop, Mass. since 1915. In 1938, neither timber groins nor concrete seawall showed signs of deterioration. Other structures added to the original system since 1915 are described and the estimate advanced that 160,000 sq. ft. of beach area has been added since the advent of beach protection.

Key Words - Timber/Accretion/N. Atlantic/Field/1900-1949/Structural-design/Low/Impermeable/

"Shorewood Protects Its Lake Front"

3807GR0004

Schmitt, H. A., The Municipality, League of Wisconsin Municipalities, July, 1938, pp. 143, 146. (V.F. 3080 12/38)

Previous groin construction and new construction of permeable groins, their cost, design, and construction procedure is discussed.

Key Words - Great Lakes/Economics/Scour/Erosion/1900-1949/Timber/Permeable/High/Long/Concrete/System/Field/Const-procedure/Structural-design/

"Protecting Galveston Beach"

3807GR0005

Washington, D. C., Civil Engineering, ASCE, Vol. 8, No. 7, July, 1938, pp. 461-462. (TA1 .C582)

Length, spacing, cost, and structural design of a groin system and accompanying seawall are given for the protection of Galveston's shoreline.

Key Words - Single/Timber/System/Economics/Artificial-fill/Steel/Impermeable/1900-1949/Texas Gulf/Structural-design/Misc-plan/Field/

"Shore Erosion and Cabbage Palmetto Groins at North Point, St. Augustine, Florida"

3811GR0001

Watkins, L. H., Nov., 1938, U. S. Army Corps of Engineers, Jacksonville District, Unpublished Report. (V.F. 3093a)

A letter and photographic review of erosion at North Point, Florida shows marked recession of the coastline that has accelerated since 1935. Four cabbage palmetto (timber) groins were constructed in July 1938. Subsequent investigations showed that the groins had no effect in preventing or retarding shore erosion.

Key Words - S. Atlantic/Field/Timber/Erosion/Misc-plan/Concrete/
Accretion/Impermeable/1900-1949/Photographic/Piling/
High/

"Effectiveness of Groins at Rockaway Beach,
Long Island, New York"

3812GR0001

Hyde, J. F. C., Dec., 1938, U. S. Army Corps
of Engineers, New York District, Unpublished
Report. (V.F. 3081 12/38)

This letter to the Beach Erosion Board evaluates the performance and cost of permeable groin extension work on groins at Rockaway Beach, New York.

Key Words - Maintenance/Economics/1900-1949/N. Atlantic/Impermeable/
Piling/Permeable/Timber/S. M. Wood/Accretion/Scour/Erosion/
Field/

"Beach Erosion Studies"

3901GR0001

Brown, E. I., Shore and Beach, American
Shore and Beach Preservation Assoc., Vol. 7,
No. 1, Jan., 1939, pp. 3-23. (TC330 .Am3)

Design criteria of groins is discussed in detail. The author recommends low, impermeable groins. Examples of systems at Palm Beach and St. Augustine and their effects are given.

Key Words - Structural-design/Piling/Accretion/Artificial-fill/
Impermeable/Low/S. Atlantic/Steel/Timber/Rubble-mound/
Scour/Permeable/System/Terminal/1900-1949/

"Shore Protection by Permeable Groins"

3907GR0001

Boase, A. J., Shore and Beach, American Shore
and Beach Preservation Assoc., Vol. 7, No. 3,
July, 1939, pp. 105-108.

Permeable S. M. Wood and Concrete pile groins are described with examples given from the Great Lakes. Groin construction and manufacture of concrete blocks are presented in detail along with a section on

merits of permeable groins.

Key Words - Permeable/Great Lakes/Scour/Erosion/Low/Concrete/Piling/
S. M. Wood/System/Structural-design/Economics/

"Effectiveness of Permeable Type Groins Used
for Beach Protection at Shorewood, Wisc. and
Other Cities Along the West Shore of Lake
Michigan" 3911GR0001
Holcombe, W. H., Nov., 1939, U. S. Army Corps of
Engineers, Milwaukee, Wisconsin, Unpublished
Report. (V.F. 3080 12/38)

Two letters and photographs review 1939 conditions and effectiveness
of permeable groins on Lake Michigan.

Key Words - Great Lakes/Misc-plan/Structural-design/Permeable/System/
1900-1949/Steel/Piling/Concrete/Timber/Impermeable/Long/
Short/High/Rubble-mound/Field/

"Erosion and Palmetto Groins at North Point,
St. Augustine, Florida" 3912GR0001
Simkins, T. D., Dec., 1939, U. S. Army Corps
of Engineers, Jacksonville District,
Unpublished Report. (V.F. 3093b)

Letters and photographs give the history of erosion at North Point,
where the North Point, St. Augustine shore has been receding since 1935.
Four cabbage palmetto (timber) groins constructed in 1937 and a stone
groin built in 1889 are evaluated.

Key Words - S. Atlantic/Photographic/1900-1949/Low/Impermeable/High/
Timber/Erosion/Field/Single/System/Concrete/Piling/

"Beach Erosion Studies" 4000GR0001
Brown, E. I., Transactions of the American
Society of Civil Engineers, Vol. 105, 1940,
pp. 869-918

Items of information considered necessary in a comprehensive beach
erosion study, the reasons for desiring each particular item, and some
general observations on design of protective works are offered. The
presentation is made for two reasons: (1) that engineers interested in
beach protection may have the advantage of experience gained by the

Beach Erosion Board about factors involved in a study of beach erosion; and (2) that the items of information now believed best suited to the purpose by the Board may be subject to full and free discussion by all engineers interested.

Key Words - Erosion/Field/Concrete/Steel/California/Misc-plan/Notched/
Impermeable/

"Beach Erosion Studies"

4000GR0002

Brown, E. I., Transactions of the American
Society of Civil Engineers, Vol. 105, Paper
No. 2076, 1940, pp. 869-918.

Groin protection is recommended where storm waves of ordinary magnitude occur and where the adjoining land is of low relief. Design criteria of groins are discussed.

Key Words - Structural-design/Artificial-fill/Timber/Piling/Impermeable/
Misc-plan/System/

"The Prevention of Coast Erosion"

4000GR0003

Du-Plat-Taylor, F.M.G., Journal of the
Institution of Civil Engineers, London,
Vol. 15, 1940-1941, pp. 53-60.

Measures to stop erosion, including seawalls, groins, and vegetation are discussed. Author gives data concerning the design, setting, and legal aspects of groin construction.

Key Words - Du-Plat-Taylor/Adjustable/Timber/Low/High/Concrete/Rubble-
mound/Misc-plan/Legal/Europe/

"Permeable Groins at Kenosha, Wisconsin"

4001GR0001

Holcombe, W. H., Jan., 1940, U. S. Army Corps of
Engineers, Milwaukee, Wisconsin, Unpublished
Report. (V.F. 3080 12/39)

Letters to the Beach Erosion Board evaluate permeable groin construction and its effectiveness as a shore protection method on the Lake Michigan shore at Kenosha, Wisconsin.

Key Words - Long/Short/Permeable/Great Lakes/1900-1949/Piling/Concrete/
Scour/Impermeable/Rubble-mound/Erosion/Accretion/S. M. Wood/
Field/

"Curved Jetties, Sea Walls, Bulkheads and Retaining Walls"

4001GR0002

Milliken, F., Milliken Method of Preventing the Erosion of Shore Fronts, and at the Same Time Building Out the Beach Making Nature Work Against Itself, Brochure, Published by F. Milliken, 44 West 44th St., New York, Jan., 1940, 3 pp. (V.F. 3105)

A type of groin-like structure is discussed. Design sketches patented by Milliken are given. However, no examples of practical applications or tests are provided.

Key Words - Theory/Milliken/Accretion/Erosion/Structural-design/

"Hawk's Nest Beach, Connecticut"

4001GR0003

Anonymous, Shore and Beach, American Shore and Beach Preservation Assoc., Vol. 8, No. 1, Jan., 1940, pp. 14-19. (TC330 .Am3)

As part of a beach protection scheme at Hawk's Nest Beach, Connecticut, the U. S. Army Beach Erosion Board recommended that six rubble-mound groins be built. History of erosion and previously constructed protective structures is given.

Key Words - Impermeable/Artificial-fill/Rubble-mound/System/Economics/
Timber Erosion/Accretion/Misc-plan/1900-1949/N. Atlantic/

"Beach Erosion Study, Orange County, Calif."

4002GR0001

U. S. Army Corps of Engineers, House Document No. 637, 76th Congress, 3rd Session, Feb., 1940.

Key Words - House Document/Not Annotated/

"Report on Shore Erosion at Tilghman Point, Md."

4006GR0001

Dent, E. J., July, 1940, 7 pp., Unpublished Manuscript. (V.F. 1813)

Report describes the extent of erosion at Tilghman Point, and proposes, as one measure, that inexpensive rip-rap groins be used to retard erosion.

Key Words - Rubble-mound/N. Atlantic/System/Erosion/Accretion/
Impermeable/

"Erosion Control at Wrightsville Beach"
Brown, E. I., Shore and Beach, American
Shore and Beach Preservation Assoc., Vol.
8, No. 4, Oct., 1940, pp. 123-124

4010GR0001

Hydraulic fill and a groin system were planned for an erosion control project at Wrightsville Beach, North Carolina. Design specifications, cost, and construction procedures are presented.

Key Words - Economics/S. Atlantic/Artificial-fill/Timber/Structural-
design/Piling/1900-1949/Const-procedures/Impermeable/

"Beach Erosion Study, St. Simon Island, Ga."
U. S. Army Corps of Engineers, House Document
No. 820, 76th Congress, 3rd Session, June 1940.

4010GR0002

Key Words - House Document/Not Annotated/

"Report on St. Simon Island Studies"
Anonymous, Shore and Beach, American
Shore and Beach Preservation Assoc., Vol. 9,
No. 1, Jan., 1941, pp. 18-23, 26-28.
(TC330 .Am3)

4101GR0001

The U. S. Army Beach Erosion Board recommended three plans for the protection of St. Simons Island, Georgia. All three plans included the construction of groins; singly and in a system, permeable and impermeable. Overall plans, projected effects, and the cost of each plan are given.

Key Words - S. Atlantic/Artificial-fill/Economics/Steel/Impermeable/
Timber/Permeable/Single/System/Misc-plan/Piling/1900-1949/

"The Prevention of Coast Erosion"
Du-Plat-Taylor, F. M. G., The Dock and Harbour
Authority, London, Vol. 21, No. 241, Apr.,
1941, pp. 125-127. (TC1 .D6)

4104GR0001

Author discusses seawalls and groins, and states that seawalls can be successful only where the beach is maintained by groins. Design and maintenance of groins is discussed.

Key Words - Europe/Concrete/Timber/High/Low/Adjustable/Erosion/System/
Structural-design/Maintenance/Impermeable/

"Coast Erosion"

4110GR0001

Keay, T. B., The Dock and Harbour Authority,
London, Vol. 21, No. 252, Oct., 1941,
pp. 241-245.

This article was written because of increasing concern with coastal erosion in Great Britain. It discusses the preferred design, use, and spacing of groins, and the design and effectiveness of other types of protective structures.

Key Words - System/High/Low/Misc-plan/Timber/Europe/Structural-design/
Long/Concrete/Du-Plat-Taylor/Adjustable/1900-1949/
Impermeable/Erosion/

"Beach Erosion Study, Coronado, Calif."

4202GR0001

U. S. Army Corps of Engineers, House
Document No. 636, 77th Congress, 2nd Session,
Feb., 1942.

Key Words - House Document/Not Annotated/

"Coast Erosion in Great Britain"

4204GR0001

Keay, T. B., Shore and Beach, American Shore
and Beach Preservation Assoc., Vol. 10, No. 1,
Apr., 1942, pp. 3-5, 22-25. (TC330 .Am3)

Groin systems, different types of designs and use are discussed along with other types of shore protection structures.

Key Words - Europe/Terminal/System/High/Low/Misc-plan/Long/Concrete/
Impermeable/Permeable/Case/Du-Plat/Taylor/Timber/Adjustable/
Misc-materials/Structural-design/1900-1949/

"Beach Protection Measures"

4206GR0001

Hall, W. C., The Military Engineer, Society
of American Military Engineers, Vol. 34,
No. 200, June, 1942, pp. 292-296.

Various types of shore protection structures, including groins, are reviewed. Different designs, their effects, and field examples are given.

Key Words - Artificial-fill/Low/System/High/Long/Impermeable/Misc-plan/
L-groins/T-groins/Steel/Piling/Permeable/Great Lakes/
California/S. Atlantic/N. Atlantic/Scour/Field/

"Beach Protection Measures"

4210GR0001

Hall, W. C., Shore and Beach, American Shore and Beach Preservation Assoc., Vol. 10, No. 2, Oct., 1942, pp. 60-64. (TC330 .Am3)

The function, design, and application of groins and other protective works are discussed. Examples are cited.

Key Words - High/Low/T-groins/L-groins/Steel/Piling/Scour/Permeable/
Great Lakes/Impermeable/Structural-design/Theory/
California/S. Atlantic/

"The Relation of the Action of Waves and Currents on Headlands to the Control of Shore Erosion by Groins"

4300GR0001

Evans, O. F., Proceedings of the Oklahoma Academy of Science, 1943, pp. 9-13.

Contrary to general opinion, the author believes that beach drifting is a more important source of sediment transportation by waves and currents than are littoral currents. Groins are discussed and improvements are noted. A permeable groin is suggested which eliminates the need for expensive preliminary surveys.

Key Words - Erosion/High/Low/Misc-plan/Permeable/Impermeable/Accretion/
Great Lakes/

"Niagara County, N. Y., Beach Erosion Study"

4308GR0001

U. S. Army Corps of Engineers, House Document No. 271, 78th Congress, 1st Session, Aug., 1943.

Key Words - House Document/Not Annotated/

"Erosion of Our Coastal Frontiers - Part II"

4405GR0001

Wood, S. M., The Illinois Engineer, Illinois Society of Engineers, Inc., Vol. 20, No. 5, May, 1944, pp. 5-34. (TC330 .W879)

Pictorial article relies upon photography showing "before and after" conditions where groins of recent type have been installed. Discussion is related to both ocean and Great Lakes riparian studies. Structural criteria of groins and the effects of artificial interference of the littoral drift are discussed.

Key Words - S. M. Wood/System/N. Atlantic/Great Lakes/Permeable/
Concrete/ Impermeable/Timber/S. Atlantic/Field/
Photographic/Long/Short/

"Steel Sheet Piling for Shore and Beach
Protection Structures"

4410GR0001

McIntosh, R. J., Shore and Beach, American
Shore and Beach Preservation Assoc., Vol.
12, No. 2, Oct., 1944, pp. 49-52.
(TC330 .Am3)

Steel sheet piling is discussed as used in beach protection structures. The author commences with a discussion of the cross section, carbon content and tensile strength of pilings used; explains method of driving, lists advantages and disadvantages of steel piling, and discusses steel corrosion.

Key Words - Steel/Const-procedure/Rubble-mound/Structural-design/
Piling/Misc-plan/Timber/Const-problems/Europe/
California/Asia/N. Atlantic/S. Atlantic/Impermeable/

"Shore Protection Methods and Materials"

4410GR0002

Kingman, J. J., Shore and Beach, American
Shore and Beach Preservation Assoc., Vol.
12, No. 2, Oct., 1944, pp. 27-30.
(TC330 .Am3)

Methods and materials for shore protection are discussed by General John J. Kingman, former senior member of the Beach Erosion Board. A review of groins, their design, and the author's own design preferences are presented. Examples of groin projects are given.

Key Words - System/Piling/Concrete/Timber/Rubble-mound/Low/Long/
Short/High/Europe/California/Structural-design/Const-
problems/Mobbs/1900-1949/

"Concrete Shore Protection Structures"

4410GR0003

Corning, L. H., Shore and Beach, American
Shore and Beach Preservation Assoc., Vol.
12, No. 2, Oct. 1944, pp. 45-48. (TC330 .Am3)

Permeable groins made of concrete, their design criteria, and examples of shore protection projects are given.

Key Words - Permeable/Concrete/Accretion/Great Lakes/S. Atlantic/
Field/1900-1949/

"Problems of Island and Coast Protection" 4500GR0001
Kramer, J., Report of West Germany Water
Economy Association, 1945, pp. 115-133.

Key Words - Not Annotated/

"Beach Erosion Study, Lake Erie Shore 45050001
Line in the Vicinity of Huron, Ohio"
U. S. Army Corps of Engineers, House
Document No. 220, 79th Congress, 1st
Session, May 1945.

Key Words - House Document/Not Annotated/

"Beach Erosion Study, Ohio Shore Line of 4505GR0002
Lake Erie from Ohio-Michigan State Line
to Marglehead, Ohio"
U. S. Army Corps of Engineers, House
Document No. 177, 79th Congress, 1st
Session, May, 1945.

Key Words - House Document/Not Annotated/

"Permeable Jetties Built to Protect 4507GR0001
Cleveland's Shore"
Anonymous, Engineering News-Record,
McGraw-Hill Pub. Co., Vol. 135, No. 2,
July, 1945, p. 89.

Illustrations and details of patented precast concrete groins
are presented.

Key Words - Great Lakes/Permeable/Concrete/Const-procedure/Structural-
design/

"Art of Beach Protection"

4510GR0001

Wood, S. M., U. S. Patent Office,
Patent No. 2,387,965, Oct., 1945,
3 pp.

An S. M. Wood groin design constructed with timber, steel, concrete or any combination thereof is presented by this patent.

Key Words - Patent/Structural-design/Erosion/Great Lakes/Scour/
Permeable/Piling/Steel/Concrete/Timber/Const-
procedure/

"Report on the Use of Asphalt at Groin
Construction in Delftland (Holland)"
Peters, A. G., Transactions of Poly-
technic Institute, No. 49/50, 1946.

4600GR0001

Key Words - Not Annotated/

"Some Sea Defence Works for Reclaimed
Lands"

4602GR0001

Dobbie, C. H., Journal of the Institu-
tion of Civil Engineers, London, Vol.
22, No. 4, Feb., 1946, pp. 267-272.
(TC345'.G7D65)

Usually a silent topic, the author presents a discussion on the terminal groin of a system. Until a solution is devised that will end the scour of the terminal groin, it is suggested that permeable lateral works, wave screens, faggoting, and groins (as low as possible) be employed to keep erosion at a minimum. Faggot-work groins, used to reduce irregularities caused by groins in shingle banks, are given special attention.

Key Words - System/Timber/Misc-plan/Piling/Terminal/Europe/
Structural-design/Permeable/Impermeable/Low/

"Piers and Jetties of Precast Concrete"
Lathrop, S. P., Rock Products, Vol. 49,
No. 2, Chicago, Illinois, Feb., 1946,
pp. 136-137.

4602GR0002

Construction of five permeable groins at Evanston, Illinois on Lake Michigan is presented in this commercial review. The groins, designed after S. M. Wood, were constructed with precast concrete blocks and anchored by piling. Specific construction procedures and a structural-design are given.

Key Words - Great Lakes/S. M. Wood/Erosion/Accretion/Concrete/
Permeable/Structural-design/High/Const-procedure/

"Beach Erosion Study, Lake Michigan
Shoreline of Milwaukee County, Wis."
U. S. Army Corps of Engineers, House
Document No. 526, 79th Congress, 1st
Session, Apr., 1946.

4604GR0001

Key Words - House Document/Not Annotated/

"Beach Erosion Study of Bakers Haulover
Inlet, Fla."
U. S. Army Corps of Engineers, House
Document No. 527, 79th Congress, 2nd
Session, Apr., 1946.

4604GR0002

Key Words - House Document/Not Annotated/

"The Problem of Coast Erosion"

4700GR0001

Duvivier, J., Journal of the Institution of Civil Engineers, London, 1947, 47 pp.
(TC257 .D2)

Included is a section giving the author's views on groin design and construction. Economics and effectiveness of the structure are discussed. Author's views are based on personal observations, and application of his designs to actual shore protection projects, examples of which are cited.

Key Words - Erosion/Europe/Timber/Piling/Adjustable/High/Scour/Low/
Maintenance/Shore/Misc-plan/Economics/Misc-materials/
Structural-design/Const-procedure/Field/Theory/
Impermeable/Long/Accretion/1900-1949/

"Experimental Steel Sheet Pile Groins, Palm Beach, Florida"

4800GR0001

Ross, C. W., U. S. Army Beach Erosion Board, Technical Memorandum, No. 10, 1948, 30 pp.
(BEB T.M. 10)

Five experimental steel pile groins were constructed on the Atlantic Coast at Palm Beach, Florida. Steel was donated by five steel companies, designs made by the Beach Erosion Board, and construction by the city of Palm Beach. Observations regarding deterioration of steel and protective coatings were made over a period of 10 years, with reports and general conclusions presented regarding useful life of steel sheet piling. Measured and observed data are tabulated.

Key Words - Field/Steel/S. Atlantic/Experimental/System/Const-problems/
Structural-design/1900-1949/Impermeable/

"Recent Storm Damage Along the Coasts of Florida and Mississippi"

4801GR0001

Anonymous, U. S. Army Beach Erosion Board Bulletin, Vol. 2, No. 1, Jan., 1948, pp. 3-4.
(BEB Vol. 2, No. 1)

A photograph in article shows a groin (at Palm Beach) flanked by a storm, and illustrates the necessity of such structures being backed by a bulkhead to protect against hurricanes.

Key Words - Erosion/Texas Gulf/S. Atlantic/Single/Impermeable/

"The Action of Groins on Beach
Stabilization"

4804GR0001

Johnson, J. W., University of California, Dept.
of Engineering, Navy Dept. Bureau of Ships
Contract NObs 2490, Technical Report HE-116-283,
Apr., 1948. (V.F. 1090 HE-116-283)

The purpose of this investigation, made at the request of the
Beach Erosion Board, was to obtain information on the comparative
action of permeable and impermeable groins presently employed to
promote accretion and stabilization of beaches where littoral transport
induced by wave action is a significant factor.

Key Words - Theory/Experimental/Photographic/Permeable/Impermeable/
Accretion/Erosion/High/Low/Scour/Single/1900-1949/

"Harrison County, Miss., Beach Erosion
Control Study"

4805GR0001

U. S. Army Corps of Engineers, House Document
No. 682, 80th Congress, 2nd Session, May, 1948.

Key Words - House Document/Not Annotated/

"Paper on Protective Works Adopted to Limit
Erosion Along the Open Coast: How They Work"
Frech, F. F., U. S. Army Corps of Engineers,
Philadelphia District, June, 1948, 35 pp.,
Unpublished Report. (TC330 .Fr48)

4806GR0001

Shore protective structures, including groins, along the New Jersey
coast are discussed and evaluated. New designs are offered where shore
conditions warrant special structures.

Key Words - N. Atlantic/Field/Piling/Timber/Rubble-mound/Single/Economics/
Accretion/Structural-design/Const-problems/Erosion/Long/High/
Short/Low/System/T-groins/Steel/Impermeable/1900-1949/
Maintenance

"Wave Action on Beaches"

4806GR0002

Jones, J. H., M. S. Thesis, June, 1948, Univ.
of California, 24 pp., Unpublished.
(GC211 .J77)

The purpose of this investigation was to study effects of groins on
wave-induced longshore currents. Studies of the effects of several types

of groins on wave action, littoral sand transport, and underwater topography in the vicinity of each structure were made. The study was largely comparative, and only the relative changes effected by each type of groin were investigated.

Key Words - Model/Photographic/Erosion/Accretion/Permeable/Impermeable/
High/Low/Scour/

"North Carolina Shoreline, Beach Erosion Study" 4812GR0001
U. S. Army Corps of Engineers, House Document
No. 763, 80th Congress, 2nd Session, Dec.,
1948.

Key Words - House Document/Not Annotated/

"Punta Las Marias, San Juan, P. R., Beach 4812GR0002
Erosion Control Study"
U. S. Army Corps of Engineers, House Document
No. 769, 80th Congress, 2nd Session, Dec.,
1948.

Key Words - House Document/Not Annotated/

"Winthrop Beach, Mass., Beach Erosion Control 4812GR0003
Study"
U. S. Army Corps of Engineers, House Document
No. 764, 80th Congress, 2nd Session, Dec.,
1948.

Key Words - House Document/Not Annotated/

"Anna Maria and Longboat Keys, Fla., Beach 4812GR0004
Erosion Study"
U. S. Army Corps of Engineers, House Document
No. 760, 80th Congress, 2nd Session, Dec.,
1948.

Key Words - House Document/Not Annotated/

"Palm Beach, Fla., Beach Erosion Study" 4812GR0005
U. S. Army Corps of Engineers, House Document

No. 772, 80th Congress, 2nd Session, Dec., 1948.

Key Words - House Document/Not Annotated/

"Santa Barbara, Calif. Beach Erosion Control Study"

4812GR0006

U. S. Army Corps of Engineers, House Document
No. 761, 80th Congress, 2nd Session, Dec., 1948.

Key Words - House Document/Not Annotated/

"Jupiter Island Fla., Beach Erosion Study"

4812GR0007

U. S. Army Corps of Engineers, House Document
No. 765, 80th Congress, 2nd Session, Dec., 1948.

Key Words - House Document/Not Annotated/

"Report to the Seventeenth International Navigation Congress"

4900GR0001

Abecasis, C. K., Seventeenth International Navigation Congress, Permanent International Association of Navigation Congresses, Brussels, Belgium, Section 2 - Ocean Navigation, Communication 1, 1949, 11 pp. (TC5 .In8r)

A general discussion of the theory of groin purpose as dependent upon design criteria is presented.

Key Words - Terminal/Misc-plan/Low/Timber/Steel/Piling/Concrete/Europe/
Theory/Rubble-mound/T-groins/Accretion/System/

"Report to the Seventeenth International Navigation Congress"

4900GR0002

Acena, V. C., Isla, A. G., and Vera, L. D., Seventeenth International Navigation Congress, Permanent International Association of Navigation Congresses, Brussels, Belgium, Section 2 - Ocean Navigation, Communication 1, 1949, pp. 21-44. (TC5 .In8r)

Key Words - Not Annotated/

"Report to the Seventeenth International
Navigation Congress"

4900GR0003

Frech, F. F., Seventeenth International
Navigation Congress, Permanent International
Association of Navigation Congresses,
Brussels, Belgium, Section 2 - Ocean
Navigation, Communication 1, 1949, pp. 45-62.
(TC5 .In8r)

Extensive construction of protective structures has ensued along a coastal resort area of New Jersey, an area subject to increasing amounts of erosion. Among the protective structures, groins are discussed in regard to design, effect, costs, with examples.

Key Words - N. Atlantic/Erosion/Timber/Rubble-mound/Misc-plan/Piling/
Economics/Structural-design/Impermeable/High/Long/Accretion/
1900-1949/Single/System/T-groins/

"Report to the Seventeenth International
Navigation Congress"

4900GR0004

Dobbie, C. H., Seventeenth International
Navigation Congress, Permanent International
Association of Navigation Congresses,
Brussels, Belgium, Section 2 - Ocean
Navigation, Communication 1, 1949, pp. 75-84.
(TC5 .In8r)

Effects of and essential design criteria of groins used in England are briefly reviewed.

Key Words - System/Scour/Erosion/Terminal/Permeable/Impermeable/Timber/
Adjustable/Steel/Mobbs/Europe/

"Report to the Seventeenth International
Navigation Congress"

4900GR0005

Duvivier, J., Seventeenth International
Navigation Congress, Permanent International
Association of Navigation Congresses,
Brussels, Belgium, Section 2 - Ocean
Navigation, Communication 1, 1949, pp. 85-103.

Author stresses that design criteria for shore protection structures, including groins, be preceded by careful field research. Various types of groins, their design, function, effect, and cost are discussed.

Key Words - Economics/Scour/Erosion/Europe/Misc-plan/Timber/Piling/Steel/
Concrete/High/Low/Long/Maintenance/Mobbs/Impermeable/Permeable/

"Report to the Seventeenth International Navigation Congress"
Viscentini, M., Pancini, G., and
Teuschl, E., Seventeenth International Navigation Congress, Permanent International Association of Navigation Congresses, Brussels, Belgium, Section 2 - Ocean Navigation, Communication 1, 1949, pp. 105-134. (TC5 .In8r)

4900GR0006

Key Words - Not Annotated/

"Report to the Seventeenth International Navigation Congress"
Thierry, J. W., and van der Burgt, J. H., Seventeenth International Navigation Congress, Permanent International Association of Navigation Congresses, Brussels, Belgium, Section 2 - Ocean Navigation, Communication 1, 1949, pp. 135-156. (TC5 .In8r)

4900GR0007

Key Words - Not Annotated/

"Sea Transportation Structures III-B"
Agatz, A., Sea Structures, Land Conservation, 1949, pp. 1080-1083.

4900GR0008

Key Words - Not Annotated/

"Coast Protection"
Minikin, R. R., The Dock and Harbour Authority, Vol. 29, Nos. 337-342, Nov., 1948 - Apr., 1949, pp. 165-169, 193-198, 232-236, 251-256, 281-285, 311-314.

4904GR0001

This article, part of a continuing series in the journal, covers numerous types of shore protection measures, their design, and problems encountered. Groin design and effect are covered.

Key Words - Timber/Europe/Long/Low/Rubble-mound/Concrete/Structural-design/Misc-plan/System/Single/Short/Great Lakes/Case/Impermeable/Accretion/

"Colonial Beach, Va., Beach Erosion
Control Study"

4909GR0001

U. S. Army Corps of Engineers, House
Document No. 333, 81st Congress, 1st
Session, Sept., 1949.

Key Words - House Document/Not Annotated/

"Deterioration of Steel Sheet Pile Groins
at Palm Beach, Florida"
Ross, C. W., Corrosion, National Association
of Corrosion Engineers, Vol. 5, No. 10,
1949, pp. 339-341. (TA462 .C65)

4910GR0001

See entry 4800GR0001.

Key Words - Field/Steel/S. Atlantic/Experimental/System/Const-
problems/Structural-design/1900-1949/Impermeable/

"All Steel Groyne - Miami Beach"
Lipp, M. N., Shore and Beach, American Shore
and Beach Preservation Assoc., Vol. 17, No. 2,
Oct., 1949, pp. 6-7.

4910GR0002

An all-steel groin consisting of variable length 27-pound steel
sheet piling, steel channel wales and steel H piling was constructed
on Miami Beach. Construction procedure and design of groin are
given.

Key Words - Steel/Piling/Scour/S. Atlantic/Const-problems/Structural-
design/1900-1949/Low/Const-procedure/Legal/Single/
Impermeable/

"Planning Shore Protection"
Scott, T. A., Shore and Beach, American
Shore and Beach Preservation Assoc., Vol. 17,
No. 2, Oct., 1949, pp. 8-9. (TC330 .Am3)

4910GR0003

The author briefly discusses effect of groins on sand movement.

Key Words - Accretion/N. Atlantic/

Winds, Waves and Maritime Structures
Minikin, R. R., Charles Griffin and
Co., Ltd., London, 1950, pp. 80,
83-85, 97, 100. (TC205 .M53)

5000GR0001

Brief discussions of groins are found throughout the text and deal mainly with deficiencies encountered in groin construction.

Key Words - Structural-design/High/Low/Accretion/Erosion/Scour/
Europe/Great Lakes/

"Origin and Decline of the Island Trischen"
Wohleberg, E., Transactions of Geographic
Society, Hamburg, Vol. 49, 1950, pp. 158-187.

5000GR0002

Key Words - Not Annotated/

"Coast Erosion"
Minikin, R. R., The Dock and Harbour Authority,
London, Vol. 30, 31, 1950, pp. 305-308, 335-
339, 369-373, 17-25, 47-51, 91-94, 127-131.

5000GR0003

Review of erosion of England's coastline and measures taken to protect shore are presented.

Key Words - Timber/Concrete/Low/High/Impermeable/Europe/Accretion/
Erosion/Case/Rubble-mound/Short/Long/1800-1900/1900-1949/
System/Piling/

"Area 1 - Ash Creek to Saugatuck River, Conn.,
Beach Erosion Control Study"
U. S. Army Corps of Engineers, House Document
No. 454, 81st Congress, 2nd Session, Jan.,
1950.

5001GR0001

Key Words - House Document/Not Annotated/

"Area 2 - Hammonasset River to East River,
Conn., Beach Erosion Control Study"
U. S. Army Corps of Engineers, House Document
No. 474, 81st Congress, 2nd Session, Feb.,
1950.

5002GR0001

Key Words - House Document/Not Annotated/

"South Shore, State of Rhode Island,
Beach Erosion Control Study" 5002GR0002
U. S. Army Corps of Engineers, House
Document No. 490, 81st Congress, 2nd Session,
Feb., 1950.

Key Words - House Document/Not Annotated/

"Atlantic City, N. J., Beach Erosion Control
Study" 5003GR0001
U. S. Army Corps of Engineers, House Docu-
ment No. 538, 81st Congress, 2nd Session,
Mar., 1950.

Key Words - House Document/Not Annotated/

"Cleveland and Lakewood, Ohio, Beach
Erosion Control Study" 5003GR0002
U. S. Army Corps of Engineers, House Docu-
ment No. 502, 81st Congress, 2nd Session,
Mar., 1950.

Key Words - House Document/Not Annotated/

"Appendix IX - Shore of Lake Erie in Lake
County, Ohio, Beach Erosion Control Study" 5005GR0001
U. S. Army Corps of Engineers, House Docu-
ment No. 596, 81st Congress, 2nd Session,
May, 1950.

Key Words - House Document/Not Annotated/

"Presque Isle Peninsula, Erie, Pennsylvania
Beach Erosion Control Study" 5005GR0002
U. S. Army Corps of Engineers, House Docu-
ment No. 397, 86th Congress, 2nd Session,
May, 1960.

"The Danish Westcoast: Littoral Drift
Problems and Measures Against Coast Erosion"
Bruun, P., The Dock and Harbour Authority,
London, Vol. 31, No. 359, Sept., 1950, pp.
163-167.

5008GR0001

Coastal protection structures, including groins, built on the west coast of Denmark are reviewed for the period from 1870 to 1950. The author gives an example of interest, noting that impermeable concrete-block groins have been sinking due to their great weight, and must be heightened periodically. Construction costs, structural design, and maintenance of structures are given.

Key Words - Europe/1900-1949/Timber/Piling/Rubble-mound/Concrete/
Erosion/Accretion/Structural-design/Economics/1950-1954/
Const-problems/Maintenance/Impermeable/System/

"Scattered Groins"
Bruun, P., Ingenioren, Denmark, Issue 38,
Sept., 1950, pp. 776-779. (Translation
available at CERC Library - TC535 .B6)

5009GR0001

Successful operation of groins depends on length and spacing of groins where impounded sediment will form a saw-toothed coast-line or a series of closed bays.

Key Words - Europe/Short/Low/System/California/Erosion/Field/Misc-
plan/Single/Impermeable/

"Design and Construction of Groins"
Horton, D. F., Proceedings of First Confer-
ence on Coastal Engineering, Council on Wave
Research of the Engineering Foundation, Oct.,
1950, pp. 246-253. (TC203 .C6)

5010GR0001

This paper is a digest on current design and construction practices concerning groin limitations, types, length and profile, spacing, and selection of type.

Key Words - Steel/Timber/Concrete/Rubble-mound/Structural-design/
Impermeable/High/Low/System/Misc-plan/Permeable/
Economics/

"Littoral Processes on Sandy Coasts"
Eaton, R. O., Proceedings of First Conference on Coastal Engineering, Council on Wave Research of the Engineering Foundation, Oct., 1950, pp. 148-149. (TC203 .C6)

5010GR0002

In a section on man made littoral barriers, basic data regarding groins and their effect upon littoral transport are presented.

Key Words - Accretion/Erosion/Short/Long/1950-1954/

"Water Economy between North and Baltic Sea, Kiel"
Weinnoldt, E., and Suhr, H., 1951.

5100GR0001

Key Words - Not Annotated/

"Seagroins on Coasts with Weak Tides and Strong Sand Drift"
Burhorn, E., Planning and Building 5, No. 3, 1951, pp. 57-62.

5100GR0002

Key Words - Not Annotated/

"Application of Asphalt in Hydraulic Engineering Works"
van der Burgt, J. H., U. S. Army Beach Erosion Board Bulletin, Vol. 5, No. 1, Jan., 1951, pp. 25-64. (BEB Vol. 5, No. 1)

5101GR0001

Research and testing during construction of asphalt structures have led to good control of the properties of asphaltic bitumen and bituminous mixtures. Use of these products in protective shoreline structures, including groins, is outlined and evaluated.

Key Words - Asphalt/N. Pacific/Texas Gulf/Europe/Field/Single/
System/Impermeable/Structural-design/

"Influence of Groins on Beach Stabilization"
Shay, E. A., and Johnson, J. W., University of California at Berkeley, Department of Engineering, Series 14, Issue 6, Beach Erosion Board Contract W49-055-eng-2, Jan.,

5101GR0002

Effect of impermeable and permeable groins was determined by comparing topography of a straight, unobstructed beach in equilibrium with a beach that had reached equilibrium after a system of groins had been installed. Model tests showed that permeable groins retained from 11% to 26% of the sand used in the experiment; far less effective than for impermeable groins. Dye tests were employed to trace the pattern of littoral movement through permeable groins.

Key Words - Laboratory/Model/Experimental/Permeable/Impermeable/
Erosion/Accretion/High/Low/System/Single/Photographic

"Revere Beach, Mass., Beach Erosion Control Study" 5105GR0001

U. S. Army Corps of Engineers, House Document No. 167, 82nd Congress, 1st Session, May, 1951.

Key Words - House Document/Not Annotated/

"Quincy Shore Beach, Mass., Beach Erosion Control Study" 5105GR0002

U. S. Army Corps of Engineers, House Document No. 145, 82nd Congress, 1st Session, May, 1951.

Key Words - House Document/Not Annotated/

"Revere Beach, Mass., Beach Erosion Control Study" 5105GR0003

U. S. Army Corps of Engineers, House Document No. 146, 82nd Congress, 1st Session, May, 1951.

Key Words - House Document/Not Annotated/

"Beach Protection Engineers Attempt to Outwit Nature at Presque Isle, Peninsula" 5109GR0001

Forney, F. H., and Lynde, G. A., Civil Engineering, ASCE, Vol. 21, No. 9, Sept.,

1951, pp. 28-31.

Since 1819 continuous projects have been underway to solve the problem of beach erosion along Presque Isle Peninsula, Pennsylvania. Protection measures, including groins and artificial fill, are reviewed.

Key Words - Erosion/Accretion/1800-1900/1900-1949/Steel/Piling/
Rubble-mound/Low/Long/Great Lakes/Impermeable/Field/
System/

"Underwater Longitudinal Works for Coastal Protection" 5200GR0001

Bomas, P., Wasserwirtschaft - Wassertechnik,
Berlin, Vol. 2, No. 5, 1952.

Key Words - Not Annotated/

Coast Erosion and Protection; Studies in Causes and Remedies 5200GR0002

Minikin, R. R., 1st ed., Chapman and Hall
Ltd., London, 1952, 240 pp. (TC330 1952)

An extensive part of this text deals with groins. Function, construction, length, spacing, orientation, and other considerations of design are presented with examples and illustrations.

Key Words - Timber/Misc-plan/ERosion/Accretion/Impermeable/High/Low/
Short/Long/System/Field/Concrete/Piling/Misc-materials/
Europe/Structural-design/Single/Great Lakes/Theory/Spur/

"Abbruch und Schutz der Steilufer an der Ostseeküste" 5200GR0003

Petersen, M., Die Küste, Kiel, West Germany
Vol. 1, No. 2, 1952, pp. 100-152. (GB4575
.K97)

Translated Title: "Breaking and Protection of Steep Shores of the Baltic Sea Coast"

Key Words - Not Annotated/

"Die Wirking der Buhne H in Wangerooge -
West auf das Seegat"
Lüders, K., Die Küste, Kiel, West Germany,
Vol. 1, No. 1, 1952, pp. 21-26. (GB457.5
.K97)

5200GR0004

Translated Title: "The Effect of Groin H in Wangerooge - West
...."

Key Words - Not Annotated/

"Die Ursachen der Abbrucherscheinungen am
West - und Nordweststrand der Insel Norderney"
Thilo, R., and Kurzak, G., Die Küste, Kiel,
West Germany, Vol. 1, No. 1, 1952, pp. 1-20.
(GB457.5 .K97)

5200GR0005

Translated Title: "Origin of Breaking Phenomena on West and
Northwest Beach of the Island of Norderney"

Key Words - Not Annotated/

"Gutachtliche Stellungnahme zu den
Untersuchungen über die Ursachen der
Abbrucherscheinungen am West - und Nord -
weststrand der Insel Norderney ..."

5200GR0006

Coastal Commission of North Sea and Baltic
Sea, Die Küste, Kiel, West Germany, Vol. 1,
No. 1, 1952, pp. 27-42. (GB457.5 .K97)

Translated Title: "Experts Report on Investigation Concerning
Reasons for Coastal Breaking Phenomena on West and North Part of
Norderney"

Key Words - Not Annotated/

"Asphalt Construction in Groin Building"
Kloss, Wosser und Boden, Hamburg, 4, No. 3,
1952, pp. 52-56.

5200GR0007

Key Words - Not Annotated/

"Summary Report on Studies of Sand Transportation by Wave Action"

5201GR0001

Anonymous, U. S. Army Beach Erosion Board Bulletin, Vol. 6, No. 1, Jan., 1952, pp. 3-6. (BEB Vol. 6, No. 1)

A model study was made of two types of groins: one, a sloping, impermeable groin; the second, a high, permeable groin. The investigation was designed to determine relative influence of the high permeable groins and the sloping impermeable groins for stabilizing a beach where littoral transport occurs. Among other conclusions it was found that permeable groins should not be used as individual units isolated along the beach, but rather in a system of groins.

Key Words - System/High/Permeable/Impermeable/Theory/Experimental/
Model/System/Single/Scour/Accretion/Erosion/1950-1954/
Misc-plan/

"Appendixes III, VII, and XII, Ohio Shore Line of Lake Erie between Fairport and Ashtabula, Beach Erosion Control Study"
U. S. Army Corps of Engineers, House Document No. 351, 82nd Congress, 2nd Session, Jan., 1952.

5201GR0002

Key Words - House Document/Not Annotated/

"Appendixes V and X, Ohio Shore Line of Lake Erie between Ashtabula and the Pennsylvania State Line, Beach Erosion Control Study"
U. S. Army Corps of Engineers, House Document No. 350, 82nd Congress, 2nd Session, Jan., 1952.

5201GR0003

Key Words - House Document/Not Annotated/

"Durability of Steel Sheet Piling in Shore Structures"
Rayner, A. C., and Ross, C. W., U. S. Army Beach Erosion Board Technical Memorandum
No. 12, Feb., 1952, 51 pp. (BEB T.M. No. 12)

5202GR0001

Along the Atlantic Coast of the United States and the Gulf Coast of Florida, 153 groups of steel sheet piling structures were

studied and classified. Structures were selected for various conditions of exposure, treatment, and types. Measurements and observations were made over a 10-year period and general conclusions presented regarding useful life of steel sheet piling. Measured and observed data are tabulated.

Key Words - N. Atlantic/S. Atlantic/Steel/Piling/Const-problems/
Field/

"Erosion Problems on the Ohio Shore of Lake Erie" 5204GR0001

Wells, J. D., Shore and Beach, American Shore and Beach Preservation Assoc., Vol. 20, No. 1, Apr., 1952, pp. 5-8. (TC330 .Am3)

The author gives a good review of costs (1952 figures) for groin projects along the Ohio shore of Lake Erie. Groins designs are given.

Key Words - Great Lakes/System/Economics/Timber/Steel/Piling/Field/
Structural-design/Artificial-fill/Rubble-mound/Concrete/
Impermeable/

"Concrete Blocks Form Low-Cost Groins" 5204GR0002
Weber, H., Engineering News-Record, McGraw-Hill Pub. Co., Vol. 148, No. 15, Apr., 1952, pp. 73-74.

Two installations of concrete-block groins were made on Long Island near Riverhead -- one in 1948, the second in 1950. The later project was built at Ocean Beach. Stabilization of the beaches has occurred. Construction procedures and structural criteria are presented.

Key Words - Concrete/Impermeable/Structural-design/N. Atlantic/
Field/Const-procedure/Economics/System/

"Report on Concrete Block Groins" 5205GR0001
Anonymous, U. S. Army Corps of Engineers, New York District, May, 1962.

Key Words - Not Annotated/

"Area 4 - Connecticut River to Hammonasset River, Conn., Beach Erosion Control Study"
U. S. Army Corps of Engineers, House Document No. 514, 82nd Congress, 2nd Session, June, 1952.

5206GR0001

Key Words - House Document/Not Annotated/

"Measures Against Erosion at Groins and Jetties"

5210GR0001

Brunn, P., Proceedings of Third Conference on Coastal Engineering, Council on Wave Research of the Engineering Foundation, Oct., 1952, pp. 137-164. (TC203 .C6)

One problem on a coast with littoral transport is erosion on the downdrift side of groins and jetties. This paper deals with the problem giving special consideration to conditions on the Danish North Sea Coast where many interesting problems of littoral transport and coastal protection are found. These are discussed as an introduction to the main part of the paper which is principally concerned with downdrift erosion and measures for its prevention.

Key Words - Erosion/Field/Misc-plan/Concrete/Model/Experimental/
Europe/Z-groins/T-groins/L-groins/Structural-design/
Economics/1900-1949/Corner-groins/Impermeable/

"Life of Steel Sheet Pile Structures in Atlantic Coastal States"

5210GR0002

Rayner, A. C., Proceedings of Third Conference on Coastal Engineering, Council on Wave Research of the Engineering Foundation, Oct., 1952, pp. 209-216. (TC203 .C6)

Harbor bulkheads, beach bulkheads, and groins constructed of steel sheet piles were studied for more accurate estimates of the useful life based on rate of deterioration. Structures were located along the Atlantic Coast of the United States and the Gulf Coast of Florida. Mean rate of loss of thickness of sheet piles is given. It is shown that different types of structures and several parts of the same structure have different rates of loss.

Key Words - Steel/Texas Gulf/S. Atlantic/Field/N. Atlantic/Const-problems/Piling/

"Case History of Shore Protection at Presque Isle Peninsula, Pa."

5210GR0003

Lee, C. E., Proceedings of Third Conference
on Coastal Engineering, Council on Wave
Research of the Engineering Foundation,
Oct., 1952, pp. 331-343. (TC203 .C6)

5210GR0003

In the 117 years in which protective works have been applied to Presque Isle Peninsula there have been many types of structures and many methods of protection attempted. The large forces involved proved too great for vegetal growth alone to be effective in the porous material which forms the peninsula. Timber structures other than the rock-filled crib groins have had short life. Bulkheads exposed to the direct action of the waves have required frequent and expensive repairs. As demonstrated by the impoundment at the privately owned Kelso groin at the junction of the peninsula and the mainland, and at experimental groins, a spending beach gives best results. The problem is the method to be used in forming the beach.

Key Words - Accretion/Cantilever/Steel/System/Economics/Erosion/
Field/1900-1949/1950-1954/Impermeable/Permeable/

"Some Aspects of Shore Protection in Boston Harbor"

5210GR0004

Wey, G. L., Proceedings of Third Conference
on Coastal Engineering, Council on Wave Re-
search of the Engineering Foundation, Oct.,
1952, pp. 190-196. (TC203 .C6)

Costs, and a brief description of short riprap groins constructed normal to a seawall are presented.

Key Words - Impermeable/Low/Rubble-mound/N. Atlantic/Field/1950-
1955/Short/Economics/System/

"Development of the New Jersey Shore"

5210GR0005

Rankin, J. K., Proceedings of Third Con-
ference on Coastal Engineering, Council on
Wave Research of the Engineering Foundation,
Oct., 1952, pp. 306-317. (TC203 .C6)

Maintenance, history, and success of shore protection works, including groins, are discussed county by county along the New Jersey shore.

Key Words - N. Atlantic/System/Maintenance/Economics/Field/

"Illinois Shore of Lake Michigan, Beach Erosion Control Study" 5210GR0006
U. S. Army Corps of Engineers, House Document No. 28, 83rd Congress, 1st Session, Oct., 1952.

Key Words - House Document/Not Annotated/

"Appendix I, Coast of California, Carpinteria to Point Mugu, Beach Erosion Control Study" 5210GR0007
U. S. Army Corps of Engineers, House Document No. 29, 83rd Congress, 1st Session, Oct., 1952.

Key Words - House Document/Not Annotated/

"Information on Beach Protection in Florida" 5210GR0008
Anonymous, State of Florida, Board of Conservation, Division of Water Survey and Research, Paper No. 8, Oct., 1952, pp. 17-22. (TD224 .F6A3 No.8)

Shore protection techniques and structures are presented. Groins are discussed giving detailed structural criteria including length, spacing, height as used along the Florida and European coastlines.

Key Words - Scour/System/Structural-design/Rubble-mound/Misc-materials/Concrete/Erosion/Single/Europe/Timber/High/Steel/S. Atlantic/

"Area 5, Pawcatuck River to Thames River, Conn., Beach Erosion Control Study" 5212GR0001
U. S. Army Corps of Engineers, House Document No. 31, 83rd Congress, 1st Session, Dec., 1952.

Key Words - House Document/Not Annotated/

"Appendix VI, Ohio Shore Line of Lake Erie, Sandusky to Vermillion, Ohio, Beach Erosion Control Study" 5212GR0002
U. S. Army Corps of Engineers, House Document No. 32, 83rd Congress, 1st Session, Dec., 1952.

"Lake Michigan Erosion Studies"

5300GR0001

Hardin, J. R., and Booth, W. H., Transactions of the American Society of Civil Engineers, Vol. 118, Paper No. 2535, 1953, pp. 39-50

The State of Illinois, acting through its Division of Waterways, has become increasingly concerned with the erosion problem of Lake Michigan. As a result, the state requested a cooperative beach erosion control study to determine the best plan of improvement for stabilizing the shoreline. This paper deals with condition of existing structures, state of erosion, and describes recommended protective measures.

Key Words - Permeable/Impermeable/Long/High/Low/Concrete/Steel/Piling/Great Lakes/Field/Structural-design/Artificial-fill/Accretion/Erosion/1900-1949/1950-1954/

"Theoretical Observations for Installation of Coastal Protective Structures on Tideless Shores"

5300GR0002

Vollbrecht, K., Wasserwirtschaft-Wassertechnik, Berlin, West Germany, Vol. 3, No. 6, 1953.

Key Words - Not Annotated/

"Report to the Eighteenth International Navigation Congress"

5300GR0003

Van Asbeck, W. F., Ferguson, H. A., Schoemaker, H. J., Eighteenth International Navigation Congress, Permanent International Association of Navigation Congresses, Brussels, Section 2 - Ocean Navigation, Question 1, 1953, pp. 169-198.

Improvement of groins along the North Sea coast by asphalt grouting is reviewed. Mix design of the asphalt grout and design of the groins are given.

Key Words - Asphalt/Rubble-mound/Structural-design/Europe/Field/Low/Impermeable/1900-1949/

"Hydraulic Structures (Groins, Dams, Dykes, and Canal Embankments) of Bitumen Type"
Rohnish, Bitumen, Heidelberg, 15, No. 9/10, 1953.

5300GR0004

Key Words - Not Annotated/

"Steep Shore of Brodten - Cause of Breaking"
Ottman, Transactions of Museum of Geography and Natural History, Lubeck, No. 44, 1953, pp. 145-195.

5300GR0005

Key Words - Not Annotated/

"Racine County, Wis., Beach Erosion Control Study"
U. S. Army Corps of Engineers, House Document No. 88, 83rd Congress, 1st Session, Feb., 1953.

5302GR0001

Key Words - House Document/Not Annotated/

"Area 6 - Niantic Bay to Connecticut River, Connecticut, Beach Erosion Control Study"
U. S. Army Corps of Engineers, House Document No. 84, 83rd Congress, 1st Session, Feb., 1953.

5302GR0002

Key Words - House Document/Not Annotated/

"Precast Concrete Block Groins"
Weber, H., Shore and Beach, American Shore and Beach Preservation Assoc., Vol. 21, No. 1, Apr., 1953, pp. 3-5. (TC330 .Am3)

5304GR0001

Use of concrete blocks for groins is discussed in relation to structural design, durability, economics, and construction procedures. The advantage of blocks is illustrated by actual projects emphasizing fast construction and low cost.

Key Words - Concrete/Economics/N. Atlantic/1900-1949/1950-1954/
Structural-design/Impermeable/Low/Field/

"Appendix IV, Ohio Shore Line of Lake Erie, Sandusky Bay, Ohio, Beach Erosion Control Study" 5304GR0002
U. S. Army Corps of Engineers, House Document No. 126, 83rd Congress, 1st Session, Apr., 1953.

Key Words - House Document/Not Annotated/

"Appendix XIV Ohio Shore Line of Lake Erie, Sheffield Lake Village to Rocky River, Beach Erosion Control Study" 5304GR0003
U. S. Army Corps of Engineers, House Document No. 127, 83rd Congress, 1st Session, Apr., 1953.

Key Words - House Document/Not Annotated/

"Coast Protection: Some Recent Works on the East Coast, 1942-52" 5306GR0001
Duvivier, J., Journal of the Institution of Civil Engineers, London, Paper No. 5901, June, 1953, pp. 510-531.

As a result of floods and erosion at Lincolnshire, England, a substantial scheme of new construction and reinforcement of the old defenses was carried out between 1943 and 1949. Costs, structural-design, and construction of these works, including groins, are presented.

Key Words - Economics/1940-1944/1945-1949/Timber/System/Field/Piling/
Europe/Structural-design/Low/Long/Impermeable/Concrete/
Steel/1950-1954/Const-procedure/Short/Accretion/Erosion/
Maintenance/Const-problems/

"Area 3 - New Haven Harbor to Housatonic River, Conn., Beach Erosion Control Study" 5306GR0002
U. S. Army Corps of Engineers, House Document No. 203, 83rd Congress, 1st Session, July, 1953.

Key Words - House Document/Not Annotated/

"Ocean City, N. J., Beach Erosion Control Study" 5306GR0003

U. S. Army Corps of Engineers, House Document 184, 83rd Congress, 1st Session, June, 1953.

Key Words - House Document/Not Annotated/

"Virginia Beach, Va., Beach Erosion Control Study" 5306GR0004

U. S. Army Corps of Engineers, House Document No. 186, 83rd Congress, 1st Session, June, 1953.

Key Words - House Document/Not Annotated/

"Materialvandring Pa Harkyster" 5306GR0005

Bruun, P., Ingeniaren, 62 Argang No. 30, July, 1953.

English Summary: "Measures Against Erosion at Groups of Groins."

Key Words - Not Annotated/

"Cold Spring Inlet (Cape May Harbor), N. J." 5307GR0001

U. S. Army Corps of Engineers, House Document No. 206, 83rd Congress, 1st Session, July, 1953.

Key Words - House Document/Not Annotated/

"Gulf Shore of Galveston Island, Tex., Beach Erosion Control Study" 5307GR0002

U. S. Army Corps of Engineers, House Document No. 218, 83rd Congress, 1st Session, July, 1953.

Key Words - House Document/Not Annotated/

"Waikiki Beach, Island of Oahu, T. H.,
Beach Erosion Control Study" 5308GR0001
U. S. Army Corps of Engineers, House Document, No. 227, 83rd Congress, 1st Session, Aug., 1953.

Key Words - House Document/Not Annotated/

"Plum Island, Mass., Beach Erosion Control Study" 5308GR0002
U. S. Army Corps of Engineers, House Document No. 243, 83rd Congress, 2nd Session, Aug., 1953.

Key Words - House Document/Not Annotated/

"Appendix VIII, Ohio Shore Line of Lake Erie between Vermillion and Sheffield Lake Village, Beach Erosion Control Study" 5308GR0003
U. S. Army Corps of Engineers, House Document No. 229, 83rd Congress, 1st Session, Aug., 1953.

Key Words - House Document/Not Annotated/

"Presque Isle Peninsula, Erie, Pa., Beach Erosion Control Study" 5308GR0004
U. S. Army Corps of Engineers, House Document No. 231, 83rd Congress, 1st Session, Aug., 1953.

Key Words - House Document/Not Annotated/

"Experimental Groins, Camp Perry, Ohio" 5309GR0001
Anonymous, Sept., 1953, Unpublished Pictorial Report. (V.F. 618 9/22/53)

A photographic history, this report reviews the construction and progressive condition of a "mix-in-place" groin for a period of two months, and construction and condition of an "intrusion grouted rockfill" groin.

Key Words - Great Lakes/Field/Experimental/Structural-design/
Impermeable/Const-procedure/Rubble-mound/Misc-
materials/1950-1954/Photographic/Single/

"Low Cost Shore Protection Used on the Great
Lakes"

5310GR0001

Brater, E. F., Proceedings of Fourth Con-
ference on Coastal Engineering, Council on
Wave Research of the Engineering Foundation,
Oct., 1953, pp. 214-226. (TC203 .C6)

This paper presents results of 3 years of field observations
on low cost beach protection structures in use on the Great Lakes.
Structures were studied in regard to their effectiveness as beach
building and protective devices and with respect to their dura-
bility in resisting ice and wave forces. The term "low cost"
refers to structures which cost between \$10 and \$30 per foot of
frontage at 1952 prices.

Key Words - Great Lakes/Accretion/Economics/Const-problems/Timber/
Concrete/Structural-design/Impermeable/

"Principles of Shore Protection for the
Great Lakes"

5310GR0002

Mason, M. A., Proceedings of Fourth Confer-
ence on Coastal Engineering, Council on Wave
Research of the Engineering Foundation, Oct.,
1953, pp. 207-213. (TC203 .C6)

The author states that a requirement of impermeability is
absolute for groins built on shores of the Great Lakes. Because
of the scarcity of natural shore sediment, permeable groins would
be inadequate. The paper presents discussion of the coastal
engineer's role and duty in shore protection.

Key Words - Great Lakes/Impermeable/

"Filling Pattern of the Fort Sheridan Groin
System"

5310GR0003

Lee, C. E., Proceedings of Fourth Conf. on
Coastal Engineering, Council on Wave Re-
search of the Engineering Foundation, Oct.,
1953, pp. 227-248. (TC203 .C6)

Analysis of the action of a groin system through the 14 months following construction is reported. Six surveys were made during this period which included onshore elevations to the bluff line and offshore soundings to about 7-foot depths. Wind records for investigation were studied, and hindcasts of wave conditions made. Analysis reveals that the cumulative volume of impoundment at the system may be expressed approximately. Tables of impoundment volumes are included as well as an energy index, and the relationship is discussed. Filling patterns of the system are recorded.

Key Words - Great Lakes/Cantilever/Steel/Accretion/Low/Long/System/
Impermeable/

"Area 7, Housatonic River to Ash Creek, Conn., Beach Erosion Control Study" 5310GR0004
U. S. Army Corps of Engineers, House Document No. 248, 83rd Congress, 2nd Session, Oct., 1953.

Key Words - House Document/Not Annotated/

"Coastal Protection, Review of Methods for Defence" 5311GR0001
Bruun, P., The Dock and Harbour Authority, London, Vol. 34-35, Nov., Dec., 1953, 10 pp. (V.F. 1289 11/53)

The author discusses and defines different types of groins, stating that they have often done more harm than good. Given also are conditions under which groins should or should not be built, and their long- and short-range influences.

Key Words - L-groins/T-groins/Z-groins/Corner-groins/Misc-plan/
Piling/Single/System/Field/Europe/Timber/Economics/
Erosion/Accretion/Impermeable/

"Appendix II, Coast of California, Point Mugu to San Pedro Breakwater, Beach Erosion Control Study" 5311GR0002
U. S. Army Corps of Engineers, House Document No. 277, 83rd Congress, 2nd Session, Nov., 1953.

Key Words - House Document/Not Annotated/

"Photographs of Ft. Macon near Morehead City, North Carolina after Series of Hurricanes in 1954" 5400GR0001
Anonymous, U. S. Army Beach Erosion Board, 1954, Unpublished Report. (V.F. 1772 (1954))

This report includes a photograph that shows 1954 hurricane damage, and presents a plan for improvement of beach stability through construction of groins.

Key Words - Photographic/Erosion/S. Atlantic/Impermeable/Rubble-mound/1950-1954/

"Model Tests with Moveable Floor in Sea and Sea Harbor Construction" 5400GR0002
Blau, E., Wasserwirtschaft - Wassertechnik, Berlin, Vol. 4, No. 4, 1954, pp. 244-251.

Key Words - Not Annotated/

"Actual Problems of Coastal Protection" 5400GR0003
Bulow, K., Wasserwirtschaft - Wassertechnik, Berlin, Vol. 2, No. 9, 1954.

Key Words - Not Annotated/

"Model Tests of Wave Run-up on Sea Dykes in Watt Region" 5400GR0004
Hansen, W., Proceedings of the Testing Institute of Hannover, Hannover, Germany, No. 5, 1954, pp. 123-165.

Key Words - Not Annotated/

"General Coastal Dynamics and Coastal Protection of the South Baltic Sea between Trave and Swine" 5400GR0005
Bulow, K., Geologie 10, 1954.

Key Words - Not Annotated/

"Appendix XI, Ohio Shore Line of Lake Erie,
Euclid to Chagrin River, Beach Erosion
Control Study"

5402GR0001

U. S. Army Corps of Engineers, House Document No. 324, 83rd Congress, 2nd Session, Feb., 1954.

Key Words - House Document/Not Annotated/

"Hampton Beach, N. H., Beach Erosion
Control Study"

5402GR0002

U. S. Army Corps of Engineers, House Document No. 325, 83rd Congress, 2nd Session, Feb., 1954.

Key Words - House Document/Not Annotated/

"Anaheim Bay Harbor, Calif."

5403GR0001

U. S. Army Corps of Engineers, House Document No. 349, 83rd Congress, 2nd Session, Mar., 1954.

Key Words - House Document/Not Annotated/

"Selkirk Shores State Park, N. Y., Beach
Erosion Control Study"

5403GR0002

U. S. Army Corps of Engineers, House Document No. 343, 83rd Congress, 2nd Session, Mar., 1954.

Key Words - House Document/Not Annotated/

"Pinellas County, Fla., Beach Erosion
Control Study"

5404GR0001

U. S. Army Corps of Engineers, House Document No. 380, 83rd Congress, 2nd Session, Apr., 1954.

Key Words - House Document/Not Annotated/

"Coast Erosion and the Development of
Beach Profiles"
Bruun, P., U. S. Army Beach Erosion Board
Technical Memorandum, No. 44, June, 1954,
pp. 2-64. (BEB T.M. 44)

5406GR0001

A groin system built during 1875-1909 and its subsequent maintenance is described. Shoreline changes, erosion profiles, and actual and theoretical quantities of eroded material along the Danish North Sea Coast are given.

Key Words - Europe/1900-1949/Concrete/Impermeable/Scour/Structural-design/Maintenance/Terminal/Field/System/Erosion/Theory/

"Fundamentals of Coast Erosion and Defence"
Minikin, R. R., Proceedings of Fifth Conference on Coastal Engineering, Council on Wave Research of the Engineering Foundation,
Sept., 1954, pp. 448-471. (TC203 .C6)

The author presents examples of European coastal problems and the remedies applied. Countries include England, Denmark, Holland, Belgium, France, Spain, and Italy.

Key Words - Low/Timber/Europe/System/Concrete/Terminal/Field/Impermeable/Scour/Accretion/High/Rubble-mound/Misc-materials/Structural-design/Steel/Short/Single/1900-1949/1950-1954/

"Bitumen in Coastal Engineering"
van Asbeck, W. F., Proceedings of Fifth Conference on Coastal Engineering, Council on Wave Research of the Engineering Foundation,
Sept., 1954, pp. 587-618. (TC203 .C6)

5409GR0002

Aspects of the design of coastal protection works using bitumen are given. A short review of important shore protection structures, including groins; methods of application and properties of bituminous construction; and a number of representative examples of each type of application are given.

Key Words - Asphalt/Structural-design/Impermeable/Misc-materials/Maintenance/Europe/1900-1949/1950-1954/

"Problèmes de Défense des Côtes Résultent de
Échecs de Quelques Ouvrages"
Dreyfous-Ducas, M., Proceedings of Fifth
Conference on Coastal Engineering, Council
on Wave Research of the Engineering Founda-
tion, Sept., 1954, pp. 495-513. (TC203 .C6)

5409GR0003

Translated Title: "Sea-Defense Problems -- Success and
Failure of Some Structures."

The author analyzes reasons of success or failure of various
sea defense works. Groins and breakwaters built since 1830 in
southwest France are discussed. For groins low permeability is
desirable, while long groins are undesirable. (Text is not trans-
lated.)

Key Words - 1800-1900/1900-1949/1950-1954/Europe/Permeable/Long/
Impermeable/

"Les Ouvrages de Défense Contre la Mer Sur
la Côte Française de L'Océan Entre la Loire
et la Gironde"

5409GR0004

Blondeau, M.; and Baste, M., Proceedings of
Fifth Conference on Coastal Engineering,
Council on Wave Research of the Engineering
Foundation, Sept., 1954, pp. 514-554.
(TC203 .C6)

Translated Title: "Sea-Defence Works of the Atlantic Coast
between the Loire and Gironde."

Among the various shore protection structures, groins, their
purpose and type of groins found along the coast between Loire and
Gironde are discussed. (Text is not translated.)

Key Words - Timber/Concrete/Misc-materials/Adjustable/Field/

"Observations on the Travel of Shore Material
Along a Chalk Foreshore"

5409GR0005

Coultas, H. W., Proceedings of Fifth Conference
on Coastal Engineering, Council on Wave Re-
search of the Engineering Foundation, Sept., 1954,
pp. 381-382. Abstract. (TC203 .C6)

Groins are discussed in an abstract of a paper published in
1920 in the Journal of the Institution of Municipal and County

Engineers, an English journal.

Key Words - System/Europe/Concrete/Accretion/Misc-plan/1900-1949/

"On the Coastal Groins"

5411GR0001

Nagai, S., Proceedings of First Conference
on Coastal Engineering, JSCE, Nov., 1954

Key Words - Not Annotated/

"Concrete Shore Protection"

5500GR0001

Anonymous, Portland Cement Association,
Chicago, Illinois, 1955, pp. 3-31. (Brochure)
(V.F. 1244)

An illustrated brochure on the use of concrete foreshore protection structures deals briefly with erosion and its causes, and presents a concise analysis of wave action. Types of seawalls, revetments, groins, and jetties are also discussed with regard to applicability of various sections of the structures to different problems.

Key Words - Concrete/System/Erosion/Structural-design/Permeable/
Geometric-shapes/1900-1949/1950-1954/Single/Impermeable/

"Allgemeine Empfehlungen für den
Deutschen Küstenschutz"

5500GR0002

Coastal Commission of North Sea and Baltic
Sea, Die Küste, Kiel, West Germany, Vol. 4, 1955,
pp. 52-61. (GS457.5 .K97)

Translated Title: "General Recommendations for German Coastal Protection."

Key Words - Not Annotated/

"Hundert Jahre Küstenschutz an der Nordsee"

5500GR0003

Lorenzen, J. M., Die Küste, Kiel, West Germany,
Vol. 3, No. 1/2, 1955, pp. 18-32. (GB457.5
.K97)

Translated Title: "Hundred Years of Coastal Protection on the North Sea."

Key Words - Not Annotated/

"What Water Economy Expects from Coastal Research" 5500GR0004

Reineke, H., Wasserwirtschaft-Wassertechnik,
Berlin, Vol. 8, 1955, pp. 249-250.

Key Words - Not Annotated/

"Beach Abrasion by Waves - Reflection on Steep Wall Type of Coastal Protective Structures" 5500GR0005

Vollbrecht, K., Wasserwirtschaft-Wassertechnik,
Berlin, No. 8, 1955, pp. 251-257, 333-339

Key Words - Not Annotated/

"Origin and Development of Island Protective Works on Norderney" 5500GR0006

Peper, G., Archives Nieders 8, No. 3, 1955-1956, pp. 175-196.

Key Words - Not Annotated

"Surge and Shore Changes on the West Coast of Sylt" 5500GR0007

Lamprecht, H., Proceedings of the Testing Institute of Hannover, Hannover, Germany, No. 8, 1955, pp. 80-136.

Key Words - Not Annotated/

"The Effect of Island Protective Structures on Beach Development in West Part of Norderney" 5500GR0008

Kramer, J., and Homeier, H., Norderney Annual Report, Vol. 6, 1955, pp. 15-38.

Key Words - Not Annotated/

"Helgoland, History of its Origin and Maintenance of its Harbor Relative to Navigation"

5500GR0009

Bahr, M., Yearbook of North Friesian Society 30, 1955, pp. 203-218.

Key Words - Not Annotated/

"The Asphalt Groins at Ocean City, Maryland"

5504GR0001

Williams, R. K., Asphalt Institute Quarterly, Vol. 7, No. 2, Apr., 1955, pp. 6-8.

Photographs illustrate construction procedures, and design criteria for asphalt groins. A subsequent survey of the 33-element groin system, constructed in 1954 at Ocean City, showed that the beach had built up.

Key Words - Asphalt/Structural-design/Const-procedures/1950-1954/
Impermeable/Low/N. Atlantic/

"The Fernandina Beach Groins"

5504GR0002

Woodson, D. D., Asphalt Institute Quarterly, Vol. 7, No. 2, Apr., 1955, p. 8.

Eight asphalt groins on Fernandina Beach, Florida, were constructed in 1953 with wood piling reenforcement. One year later the system had caused a marked buildup of material.

Key Words - Impermeable/Timber/Piling/S. Atlantic/Structural-design/
1950-1954/Low/Asphalt/

"Stability of Beaches"

5504GR0003

Bruun, P., Shore and Beach, American Shore and Beach Preservation Assoc., Vol. 23, No. 1, Apr., 1955, pp. 21-25. (TC330 .Am3)

Groins, seawalls, breakwaters, and artificial nourishment are

discussed. A figure gives in tabulated format the effects of four protective measures under different conditions of the beach.

Key Words - Adjustable/Artificial-fill/Erosion/Accretion/

"Grand Isle, La., Beach Erosion Control Study" 5504GR0004

U. S. Army Corps of Engineers, House Document No. 132, 84th Congress, 1st Session, Apr., 1955.

Key Words - House Document/Not Annotated/

"Fair Haven Beach State Park, N. Y., Beach Erosion Control Study" 5504GR0005

U. S. Army Corps of Engineers, House Document No. 134, 84th Congress, 1st Session, Apr., 1955.

Key Words - House Document/Not Annotated/

"Hamlin Beach State Park, N. Y., Beach Erosion Control Study" 5504GR0006

U. S. Army Corps of Engineers, House Document No. 138, 84th Congress, 1st Session, Apr., 1955.

Key Words - House Document/Not Annotated/

"How to Build a Beach at Economy Prices" 5509GR0001

Anonymous, Engineering News-Record, McGraw-Hill Pub. Co., Vol. 155, No. 10, Sept. 8, 1955, pp. 34-36, 40-41.

The article describes low, impermeable groins, and states that asphalt groins are more economical than comparable timber groins. Design, construction, and success of asphalt groins built on the coast of Maryland is presented and compared with that of timber groins.

Key Words - N. Atlantic/Asphalt/Timber/Economics/Impermeable/Low/Const-procedure/Structural-design/Permeable/Scour/Const-problems/Accretion/System/

"City of Kenosha, Wis., Beach Erosion Control Study"

5509GR0002

U. S. Army Corps of Engineers, House Document No. 273, 84th Congress, 2nd Session, Sept., 1955.

Key Words - House Document/Not Annotated/

"Maryland's Favorite Beach at Ocean City"

5510GR0001

Hopkins, W. C., Shore and Beach, American Shore and Beach Preservation Assoc., Vol. 23, No. 2, Oct., 1955, pp. 8-11. (TC330 .Am3)

A historical review of shore protection structures and their effects at Ocean City is given. In 1954 a 33-element, asphalt groin system was built. Structural and mix designs, costs, and construction procedures of the asphalt groins are presented.

Key Words - Haupt/Timber/Permeable/1900-1949/Accretion/N. Atlantic/Impermeable/System/1950-1954/Asphalt/1955-1959/Const-procedure/Const-problems/Economics/High/Low/

"Division of Shore Erosion - Ohio"

5510GR0002

Kugel, F. O., Shore and Beach, American Shore and Beach Preservation Assoc., Vol. 23, No. 2, Oct., 1955, pp. 20-23. (TC330 .Am3)

Groin construction projects along the Ohio shore of Lake Erie including experimental projects are reviewed. Structural design and costs of construction are given.

Key Words - Great Lakes/1950-1954/Timber/Piling/Steel/Economics/Experimental/Field/Rubble-mound/Impermeable/System/

"Coastal Development and Coastal Protection"

5511GR0001

Bruun, P., Engineering Progress at the University of Florida, Bulletin Series No. 76, Vol. 9, No. 11, Nov., 1955, pp. 7-30. (TC203 .F62v9no11)

An attempt is made to explain the connection between coastal development and coastal protection. Florida has two problems; the sea, and property owners at the seashore who often build homes too

close to the shoreline. The problems involved in beach erosion are explained in terms of source and loss of materials. Beach profiles, groins, and revetments are discussed.

Key Words - S. Atlantic/System/Structural-design/Field/Timber/
Rubble-mound/Permeable/Impermeable/T-groins/L-groins/
Z-groins/Corner-groins/Misc-plan/Piling/

"Asphalt Groins and Jetties"

5511GR0002

Asphalt Institute, Asphalt Leads
the Fight Against Beach Erosion,
Information Series, No. 94, Nov., 1955,
pp. 1-5. (V.F. 928 11/55)

Presenting a pictorial review of various groin construction sites, this article also gives design specifications, mix design, and construction specifications for asphalt groins.

Key Words - Asphalt/Const-procedure/S. Atlantic/Structural-design/
N. Atlantic/Impermeable/

"The Longitudinal Stability of Beaches"

5511GR0003

Hoyle, J. W., and King, G. T., Journal
of the Institution of Municipal Engineers,
London, Vol. 82, No. 5, Nov., 1955, pp. 181-
191. (GB454 B3H6)

A brief mention is made concerning the application and basic purpose of groins for foreshore stabilization.

Key Words - Accretion/Misc-plan/Theory/

"On the Flow Characteristics in the
Vicinity of Groins"

5511GR0004

Shimano, T., Hom-ma, M., and Horikawa, S.,
Proceedings of the Third Conference on
Coastal Engineering in Japan, JSCE, Vol. 3,
Nov., 1955, pp. 195-202. (TC203 .C748)
(Not Translated)

Key Words - Not Annotated/

"On the Alignment of Coastal Groins"
Nagai, S., Proceedings of the Second
Conference on Coastal Engineering in
Japan, JSCE, Nov., 1955, pp. 107- 116.
(TC203 .C748) (In Japanese)

5511GR0005

Key Words - Not Annotated/

"On the Effects of Groins"
Shimano, T., Hom-ma, M., and Horikawa, S.,
Proceedings of the Second Conference on
Coastal Engineering in Japan, JSCE, Nov.,
1955, pp. 49-56. (TC203 .C748) (In
Japanese)

5511GR0006

Key Words - Not Annotated/

"Some Ideas on the Problem of Research
in Coastal Dynamics and Model Tests of
Coastal Protection"
Bruns, E., Wasserwirtschaft-Wassertechnik,
Berlin, No. 12, 1956, pp. 387-390.

5600GR0001

Key Words - Not Annotated/

"What Happened to Protection of Our Baltic
Sea Coast?"
Kolp, O., Wasserwirtschaft-Wassertechnik,
Berlin, Vol. 6, No. 8, 1956, pp. 229-231.

5600GR0002

Key Words - Not Annotated/

"Island Protection on East-Friesian Coast"
Jansen, T., Hansa, Hamburg, Vol. 93, No. 44/45,
1956, pp. 2108-2110.

5600GR0003

Key Words - Not Annotated/

"Aus den Arbeiten des Küstenausschusses
Ost"
Reineke, H., Die Küste, Kiel, West Germany,
Vol. 5, 1956, pp. 1-8. (GB457.5 .K97) (Not

5600GR0004

Translated)

Translated Title: "Works of the Coastal Commission - East"

Key Words - Not Annotated/

"Flood Protection and Coast Stabilization" 5600GR0005
Leopold, E., Hutte, Berlin, Vol. 3, 1956,
pp. 1076-1082.

Key Words - Not Annotated/

"Suitability of Model Tests in Maritime 5600GR0006
Engineering in Harbors, Seaways, and
Coastal Protection"
Zschiesche, O., Wasserwirtschaft-Wassertechnik,
Berlin, No. 12, 1956, pp. 383-386.

Key Words - Not Annotated/

"Coastal Changes and Coastal Protection of 5600GR0007
the Island Hiddensee"
Reinhard, H., Berlin, 1956.

Key Words - Not Annotated/

"Asphalt Groins in U. S. A." 5600GR0008
Peters, A. G., Baumasch und Bautechnik
3, No. 11, 1956, p. 337.

Key Words - Not Annotated/

"Behavior of Beach Fill at Ocean City, 5602GR0001
New Jersey"
Watts, G. M., U. S. Army Beach Erosion
Board Technical Memorandum, No. 77,
Feb., 1956, 33 pp.

Analysis of beach erosion at Ocean City, New Jersey, led to the
conclusion that the most suitable plan of protection was artificial

placement of suitable sand on the shore and extension of seven existing stone groins. A study of the completed project revealed that loss of beach fill exceeded the estimated rate because: (1) fill sediment was finer-grained than the native sand; (2) shifting of inlet channels and bars caused extensive movement of beach material and; (3) the shoreline in the project area advanced relative to the adjacent shoreline to the southwest.

Key Words - Rubble-mound/System/Field/Impermeable/Erosion/
N. Atlantic/Accretion/

"Manitowoc County from Two Rivers to
Manitowoc, Wis., Beach Erosion Control
Study"

5602GR0002

U. S. Army Corps of Engineers, House
Document No. 348, 84th Congress, 2nd
Session, Feb., 1956.

Key Words - House Document/Not Annotated/

"Shore of New Jersey from Sandy Hook to
Barnegat Inlet, Beach Erosion Control
Study"

5603GR0001

U. S. Army Corps of Engineers, House
Document No. 361, 84th Congress, 2nd Session,
Mar., 1956.

Key Words - House Document/Not Annotated/

"Beach Erosion Control Grand Isle,
Louisiana"

5604GR0001

Myers, H. B., and Theis, A. R., Shore and
Beach, American Shore and Beach Preservation
Assoc., Vol. 24, No. 1, Apr., 1956, pp. 19-
22. (TC330 .Am3)

A series of fourteen timber groins were built at Grand Isle, Louisiana to control erosion. Erosion was not checked, and following Beach Erosion Board recommendations, hydraulic fill was introduced into the system. Preparation procedures are outlined, quantitative figures on sand loss and gain, and textural characteristics of the sand are given.

"Oceanside, Ocean Beach, Imperial Beach,
and Coronado, San Diego County, Calif.,
Beach Erosion Control Study" 5605GR0001
U. S. Army Corps of Engineers, House
Document No. 399, 84th Congress, 2nd
Session, May, 1956.

Key Words - House Document/Not Annotated/

"Area 9, East River to New Haven Harbor,
Connecticut, Beach Erosion Control Study" 5605GR0002
U. S. Army Corps of Engineers, House
Document No. 395, 84th Congress, 2nd
Session, May, 1956.

Key Words - House Document/Not Annotated/

"Fire Island Inlet to Jones Inlet, Long
Island, N. Y., Cooperative Beach Erosion
Control Study" 5605GR0003
U. S. Army Corps of Engineers, House
Document No. 411, 84th Congress, 2nd
Session, May, 1956.

Key Words - House Document/Not Annotated/

"Waimea Beach and Hanapepe Bay, Island of
Kauai, T. H., Beach Erosion Control Study" 5606GR0001
U. S. Army Corps of Engineers, House Docu-
ment No. 432, 84th Congress, 2nd Session,
June, 1956.

Key Words - House Document/Not Annotated/

"Interim Report on Asphalt Groins at Ocean
City, Maryland" 5607GR0001
Anonymous, Beach Erosion Board Interim Report,
July, 1956. (V.F. 1890 7/56)

Study of asphalt structures as shore protection works is a part of the Beach Erosion Board's General Investigation Program to evaluate the structural and functional effectiveness of shore protective structures. The objective of the study of existing asphalt shore structures is to compile information on the structural and functional performance of these structures. A final report will be prepared when sufficient data are compiled.

Key Words - Photographic/System/Field/Impermeable/

"Curved Groynes and Foreshore Defence"
Rylands, A., Civil Engineering and Public
Works Review, London, July, 1956, pp. 769-
772. (V.F. 1989)

5607GR0002

The author states that alternating straight and curved groins in a system is superior to an exclusively straight groin system for the following reasons: (1) considerable neutralization of wave assault, (2) reduction in backwash scour, (3) stoppage of littoral drift, (4) reduced sensitivity to changes in wind direction, (5) ability to deposit material to leeward, straight onshore, or to windward as required for the formation of a uniformly protective beach.

Key Words - Misc-plan/Low/Timber/Notched/Field/1955-1959/Structural-
design/Impermeable/Europe/

"Arrangement of Groins on a Sandy Beach"
Nagai, S., Journal of Waterways and
Harbors Division, ASCE, Vol. 82, No. WW4,
Paper 1063, Sept., 1956, 13 pp. (TC305
.J3v.2)

5609GR0001

It is an important and difficult problem to arrange groins effectively for protection against erosion by wave action on a sandy shore. This paper presents the relation of groin length, space, and orientation with respect to the shoreline, direction of wave propagation, and breaking point of the breakers. Relationship between wave steepness and sand transport, and some results of experiments concerning special types of groins are also presented.

Key Words - Scour/Erosion/Accretion/Experimental/Misc-plan/Long/Short/
Model/Impermeable/Theory/Single/System/Structural-design/

"Timber in the Construction of Sea Defence
and River Works"

5609GR0002

Cotton, K. E., Civil Engineering and Public
Works Review, London, Sept., 1956, pp. 998-
1001. (V.F. 3020)

This article presents the author's practical experience in the
use of timber in sea defense and river works, and offers observations
concerning merits of timber.

Key Words - Timber/Europe/Misc-plan/Structural-design/Steel/Permeable/
Impermeable/

"Impermeable and Permeable Groins"

5700GR0001

Bruun, P., 1957, Coastal Engineering
Laboratory, Univ. of Florida, Un-
published Commentary, 3 pp. (TC535 .B4)

Author comments on groin adjustability, ruggedness, and perme-
ability.

Key Words - Permeable/Adjustable/Impermeable/Misc-plan/

"Functions of Groins Fundamental Study
on Beach Sediment Affected by Groins (1)"

5700GR0002

Shimano, T., Hom-ma, M., Horikawa, K.,
Sakou, T., Proceedings of the Fourth
Conference on Coastal Engineering in
Japan, JSCE, 1957, pp. 111-121.
(TC20d .C748)

This study examines the mechanism of beach deformation and pro-
vides criteria for the design of a groin. Functions of a groin are
related to such factors as the characteristics of waves in the surf
zone, sediment motion by waves and littoral currents, and eventual
deformation of beach and nearshore topographies.

In building groins, the angle to the shoreline should be directed
updrift, and the lengths should be adjusted so the tips will form a
natural curve merging with the downcoast shoreline.

Key Words - Scour/Model/Long/Experimental/Impermeable/Erosion/
Accretion/

Die Nordöstliche Heide Mecklenburgs
Kolp, O., Veb Deutscher Verlag der
Wissenschaften, Berlin, 1957, 282 pp.

5700GR0003

Translated Title: "The North Heath of Mecklenburg"

Key Words - Not Annotated/

"Provisions for Stabilization and Main-
tenance of Floating Islands of the South
Coast of German North Sea"
Jansen, T., and Hansen, W., German Report
of Nineteenth Planc, London, 1957.

5700GR0004

Key Words - Not Annotated/

"Construction of a Heavy Dune Cover by
Asphalt - Basalt Method on the Island of
Borkum"
Braun, W., Bitumen, Heidelberg, 8/9, 1957,
pp. 176-182.

5700GR0005

Key Words - Not Annotated/

"Uferveränderungen und Küstenschutz auf
Sylt"
Lamprecht, H., Die Küste, Kiel, West
Germany Vol. 6, No. 2, 1957, pp. 39-93.
(GB457 .K97) (Not Translated)

5700GR0006

Translated Title: "Coastal Changes and Coastal Protection on
Sylt"

Key Words - Not Annotated/

"Folgerungen aus Untersuchungen über
Küstenschutzprobleme auf Sylt"
Rieder, K., Die Küste, Kiel, West Germany,
Vol. 6, No. 1, 1957, pp. 1-2. (GB457.5
.K97) (Not Translated)

5700GR0007

Translated Title: "Coastal Changes and Coastal Protection
Problems of the Island Sylt"

Key Words - Not Annotated/

"Die Abbruchursachen an der Nordwestküste
des Ellenbogens auf Sylt"

5700GR0008

Hundt, C., Die Küste, Kiel, West Germany,
Vol. 6, No. 2, 1957, pp. 3-38.
(GB457.5 .K97) (Not Translated)

Translated Title: "Causes of Slides on the Northwest Part of
Sylt"

Key Words - Not Annotated/

"Küstenforschungen im Raum Fehmarn-
Nordwagrien"

5700GR0009

Magens, C., Die Küste, Kiel, West Germany,
Vol. 6, No. 1, 1957, pp. 4-39.
(GB457.5 .K97) (Not Translated)

Translated Title: "Coastal Researches in the Area of Fehmarn-
Nordwagrien."

Key Words - Not Annotated/

"Brandungsuntersuchungen an den Küsten
von Fehmarn und Nordwagrien"

5700GR0010

Magens, C., Die Küste, Kiel, West Germany,
Vol. 6, No. 1, 1957, pp. 40-63.
(GB457.5 K97) (Not Translated)

Translated Title: "Surge Investigations on the Coast of Fehmarn
and Nordwagrien"

Key Words - Not Annotated/

"Effects of Coastal Protective Structures on
Sylt"

5700GR0011

Lamprecht, H., Wasserwirtschaft, Stuttgart,
Vol. 47, No. 5, 1957.

Key Words - Not Annotated/

"Coastal Protection and Scientific Basis of Research"
Schmitz, H. P., Wasserwirtschaft-Wassertechnik, Berlin, West Germany, Vol. 7, No. 2, 1957, pp. 64-74.

5700GR0012

Key Words - Not Annotated/

"Possibilities and Limits for Application of Asphalt Types of Constructions for Coastal Protection"
Zischer, F. F., Proceedings of the Testing Institute of Hannover, No. 12, 1957.

5700GR0013

Key Words - Not Annotated/

"Artificial Restoration of Beaches with Special Regard for Beach Flushing, Norderney, 1951-52"
Kramer, J., Annual Report of Research Institute, Norderney, Vol. 9, 1957, pp. 107-139.

5700GR0014

Key Words - Not Annotated/

"Protection Works on the Mexican Coast: the Creation of Beaches and Dunes"
Diaz-Marta, M., The Dock and Harbour Authority, London, Vol. 37, Nos. 435-436, Jan., Feb., 1957, pp. 306-309, 338-340.

5701GR0001

A system of four rubble-mound groins was constructed at Vera Cruz, Mexico. Among the various protective structures constructed, these groins helped to stabilize the beach.

Key Words - Rubble-mound/Central America/System/1955-1959/

"Chatham, Mass., Beach Erosion Control Study"
U. S. Army Corps of Engineers, House Document No. 167, 85th Congress, 1st Session, Apr., 1957.

5704GR0001

"Photographs of Compo Beach, Westport,
Conn. After Groin Construction and Before
Fill Placement"

5705GR0001

U. S. Army Corps of Engineers, May, 1957,
New England Division, Boston, Mass.,
Unpublished Report. (V.F. 1772 5/17/57
Westport)

Four 8- by 10-inch oblique aerial photographs show Compo Beach,
Westport, Conn. after groin construction, but before fill was placed.

Key Words - Single/Field/Impermeable/Rubble-mound/N. Atlantic/
1955-1959/Long/Low/Photographic/

"Photographs of Sasco Hill Beach, Fairfield,
Conn. After Groin Construction and Before
Fill Placement"

5705GR0002

U. S. Army Corps of Engineers, May, 1957,
New England Division, Boston, Mass., Un-
published Report. (V.F. 1772 5/17/52
Fairfield)

Three 8- by 10-inch oblique aerial photographs of Sasco Hill
Beach, Fairfield, Conn., show groins before fill was placed.

Key Words - Single/Field/Impermeable/Rubble-mound/N. Atlantic/
1955-1959/Long/Low/Photographic/

"Areas 8 and 11, Saugatuck River to Byram
River, Conn., Beach Erosion Control Study"

5705GR0003

U. S. Army Corps of Engineers, House Docu-
ment No. 174, 85th Congress, 1st Session,
May, 1957.

Key Words - House Document/Not Annotated/

"Santa Cruz County, Calif., Beach Erosion
Control Study"

5705GR0004

U. S. Army Corps of Engineers, House Docu-
ment No. 179, 85th Congress, 1st Session,

May, 1957.

Key Words - House Document/Not Annotated/

"Delaware Coast from Kitts Hummock to Fenwick Island, Beach Erosion Control Study" 5707GR0001
U. S. Army Corps of Engineers, House Document No. 216, 85th Congress, 1st Session, July 1957.

Key Words - House Document/Not Annotated/

"Asphalt Groins - Two-year Report" 5708GR0001
Anonymous, Engineering News-Record, McGraw-Hill Pub. Co., Vol. 159, Aug. 22, 1957, pp. 42-44.

Asphalt groins were inspected 2 years after construction. Inspection showed that the groins had caused accretion of sediment and that during at least six hurricanes and many lesser storms they had held the beach.

Key Words - Asphalt/N. Atlantic/Economics/Low/Impermeable/1950-1954/1955-1959/System/Accretion/Erosion/

"Appendix VI, Humboldt Bay (Buhne Point), Calif., Beach Erosion Control Study" 5709GR0001
U. S. Army Corps of Engineers, House Document No. 282, 85th Congress, 2nd Session, Sept., 1957.

Key Words - House Document/Not Annotated/

"Florida Coastal Problems" 5712GR0001
Bruun, P., Gerritsen, F., and Morgan, w. H., Proceedings of Sixth Conference on Coastal Engineering, Council on Wave Research of the Engineering Foundation, Dec., 1957, pp. 463-509. (TC203 .C6)

A short review describes the types of groins used along Florida's

shoreline. The authors believe that the best groin for Florida is either the low, impermeable, nonadjustable groin or the impermeable, adjustable type.

Key Words - Impermeable/S. Atlantic/Permeable/Adjustable/System/
Artificial-fill/Timber/Concrete/Structural-design/

"Some Coastal Engineering Problems in India"
Joglekar, D. V., Gole, C. V., and
Apte, A. S., Proceedings of Sixth Conference
on Coastal Engineering, Council on Wave
Research of the Engineering Foundation, Dec.,
1957, pp. 510-519. (TC203 .C6)

5712GR0002

A section of coastline on the southern tip of India was subject to increasing amounts of erosion. A breakwater and an 11-element impermeable groin system were constructed as an experiment. Laboratory model experiments were also made. Observation of the structures in field and laboratory led to proposed advantageous construction of protective structures along other parts of shoreline where erosion was eminent.

Key Words - Experimental/Field/Rubble-mound/System/Misc-plan/
Accretion/Asia/Model/Structural-design/Long/Impermeable/
Erosion/Scour/

"The Origin and Stability of Beaches"
Hoyle, J. W., and King, G. T., Proceedings
of Sixth Conference on Coastal Engineering,
Council on Wave Research of the Engineering
Foundation, Dec., 1957, pp. 281-301.
(TC203 .C6)

5712GR0003

Compression of wet or "running sand" can be produced by correctly designed groins, resulting in the stabilization of beaches. According to the authors, groins must be impermeable, substantial in construction so that they can withstand the longitudinal thrust of stabilized beach material, and high and long enough so that beach material will not be lost over or around them.

Key Words - Impermeable/Long/High/Theory/

"Palm Beach County from Lake Worth Inlet
to South Lake Worth Inlet, Florida, Beach
Erosion Control Study"

5712GR0004

Key Words - House Document/Not Annotated/

"Biological Help in Coastal Protection" 5800GR0001
Bulow, K., Wasserwirtschaft-
Wassertechnik, Berlin, Vol. 8, No. 2,
pp. 54-63.

Key Words - Not Annotated/

"Schutz und Entwässerung der Niederungs- 5800GR0002
gebiete an der Schleswig-Holsteinischen
Ostseeküste"
Kannenbert, E. G., Die Küste, Kiel, West
Germany, Vol. 7, No. 1, 1958/1959, pp.
47-106. (GB457.5 .K97) (Not Translated)

Translated Title: "Protection and Drainage of Depressed Areas
of the Schleswig-Holstein Baltic Sea Coast"

Key Words - Not Annotated/

"Dune Protective Works on Sylt" 5800GR0003
Lamprecht, H., Bautechnik, Berlin, Vol. 35,
No. 1, 1958, pp. 16-20.

Key Words - Not annotated/

"Basic Coastal Model" 5800GR0004
Anonymous, Hydraulics Research 1957,
Department of Scientific and Industrial
Research, Her Majesty's Stationery Office,
London, 1958, pp. 52-54. (TC158 .G7
G786b)

Experimental study on groins shows: (1) High, impermeable groins
closely spaced trapped greatest amount of material; (2) no loss of
sand occurred if sand built up to the top of the groins; (3) low,

widely spaced groins are to be preferred, and (4) permeable groins had little influence on longshore transport.

Key Words - System/Transport-normal/Model/High/Impermeable/Low/Misc-plan/Permeable/Rubble-mound/Experimental/Erosion/Accretion/

Water Economy between North Sea and
Baltic Sea, 1948-58
Rieder, K., and Suhr, H., Kiel, 1958.

5800GR0005

Key Words - Not Annotated/

Manuel of Water Economy
Press, H., Hamburg, 1958.

5800GR0006

Key Words - Not Annotated/

"Swell and Surge as Basis for Planning
and Design in Sea Structures and Coastal
Protection"
Magens, C., Proceedings of the Testing
Institute of Hannover, No. 14, 1958.

5800GR0007

Key Words - Not Annotated/

"Thames River to Niantic Bay, Conn.,
Beach Erosion Control Study"
U. S. Army Corps of Engineers, House
Document No. 334, 85th Congress, 2nd
Session, Jan., 1958.

5801GR0001

Key Words - House Document/Not Annotated/

"Berrien County, Michigan, Beach Erosion
Control Study"
U. S. Army Corps of Engineers, House Docu-
ment No. 336, 85th Congress, 2nd Session,
Feb., 1958.

5802GR0001

Key Words - House Document/Not Annotated/

"Shore of New Jersey from Sandy Hook To
Barnegat Inlet, Beach Erosion Control
Study"
U. S. Army Corps of Engineers, House Docu-
ment No. 332, 85th Congress, 2nd Session,
Feb., 1958.

5802GR0002

Key Words - House Document/Not Annotated/

"Feeder Beaches and Groins Restore Presque
Isle Peninsula"
Omstead, L. W., and Lynde, G. A., Civil
Engineering, ASCE, Vol. 28, No. 3, Mar.,
1958, pp. 172-175.

5803GR0001

Since 1819 Presque Isle Peninsula, Pennsylvania, has been subjected to increasing amounts of erosion. A program involving placement of fill, and construction of bulkheads and groins was started in 1955 to restore the peninsula and combat erosion.

Key Words - Erosion/Great Lakes/Artificial-fill/System/Field/
Experimental/Steel/Misc-plan/Concrete/Economics/1955-1959

"South Kingstown and Westerly, R. I.,
Beach Erosion Control Study"
U. S. Army Corps of Engineers, House
Document No. 30, 86th Congress, 1st
Session, Sept., 1958.

5809GR0001

Key Words - House Document/Not Annotated/

"An Experimental Study on the Effect of
Coastal Groins"
Horikawa, K., and Sonu, C., Coastal
Engineering in Japan, Committee of
Coastal Engineering, JSCE, Vol. 1, Oct.,
1958, pp. 59-74. (TC203 .C652)

5810GR0001

This report was not designed to present design formula for groins, but points out that flow patterns in the vicinity of groins are far

more complicated than has generally been realized. Along with analysis of flow patterns, characteristics of sand movement around groins are discussed.

Key Words - Erosion/Scour/Accretion/Impermeable/Permeable/Low/
Adjustable/Misc-plan/System/Experimental/Model/Single/
Theory/

"Summary Statement Concerning Importance of a Groin Design Criterion" 5810GR0002
Wicker, C. F., Seminar on Groins at Princeton, N. J., ASCE Sponsored, Oct., 1958, 2 pp., Unpublished.

At the updrift lip of an inlet or at the updrift side of a submarine canyon, it is desirable to trap and conserve all of the supply of sand. To do this, a groin must be long, high, and impermeable. Writer believes that these are the only situations where such a structure is desirable.

Key Words - Impermeable/Structural-design/Erosion/Accretion/High/
Long/Low/

"Motion of Sand Particles Between Groins" 5812GR0001
Nagai, S., and Kubo, H., Journal of Waterways and Harbors Division, ASCE, Vol. 84, No. WW5, Paper 1876, Dec., 1958, 28 pp.

Experiments on the motion of sand particles between groins were performed in a fixed basin to compare with the results of groins in a movable bed. The comparison proved that both results were in comparatively good agreement. Experimental results were found for beaches without groins, with single groins, with a groin system, with various groin spacing, and different angle of wave incidence.

Key Words - Experimental/Single/System/Theory/Misc-plan/Model/
Impermeable/

"Protecting Our Shore Line" 5812GR0002
Brater, E. F., Consulting Engineer, Vol. 11, No. 6, Dec., 1958, pp. 92-96.

Among various shore protection methods, author briefly discusses

groin systems, maintaining that they should be impermeable. Spacing and length of groins are considered.

Key Words - Great Lakes/Rubble-mound/Timber/Impermeable/Low/Field/
High/Short/Artificial-fill/System/

"Model Investigations of Harbor Inlet Siltling" 5900GR0001

Blau, E., Wasserwirtschaft-Wassertechnik,
Berlin, Vol. 9, 1959, pp. 244-251.

Key Words - Not Annotated/

"Groins with Asphalt Grout in East Friesian Coast Region" 5900GR0002

Jansen, T., Bitumen, Heidelberg, No. 3,
1959.

Key Words - Not Annotated/

"Littoral-Drift Problem at Shore-Line Harbors" 5900GR0003

Johnson, J. W., Transactions of the
American Society of Civil Engineers,
Vol. 124, Paper No. 2992, 1959, pp.
525-555.

Structures protecting California's harbors have interrupted the littoral drift. These structures often act as complete barriers causing sediment to be trapped. Examples are Santa Barbara, Camp Pendleton, and Santa Monica.

Key Words - California/Accretion/Field/

"Receding of Shoreline at Cochin by Groynes and a Seawall" 5900GR0004

Anonymous, 1959, Central Water and Power
Research Station Poona, Poona, India,
Annual Research Memoirs, Ministry of Irrigation
and Power, pp. 283-287. (TC158 .I4 I39a)

Effects of a 10-element groin system near Cochin, India during 1956-1957 are discussed.

Key Words - System/Asia/1955-1959/1950-1954/Impermeable/

"Sea Defence Groynes"

5900GR0005

Oliver, A. C., and Richardson, H.,
Timber Development Association, London,
1959.

Key Words - Not Annotated/

Cultivated Land Conservation and
Reclamation

5900GR0006

Press, H., Berlin and Hamburg, 1959.

Key Words - Not Annotated/

"Better Jetty for Less Money"

5903GR0001

Reed, T. M., Municipal Construction,
Mar., 1959. (V.F. 19 3/59)

Asphalt-coated, corrugated, metal sheets were used to construct a jetty at Savannah Beach, Georgia. Use in the construction of groins is promoted.

Key Words - Asphalt/Steel/S. Atlantic/1955-1959/Const-procedure/
Economics/

"Coastal Engineering Study at Pompano
Beach"

5903GR0002

Bruun, P., Mar., 1959, Unpublished Report
Prepared for the City of Pompano Beach,
Florida, Coastal Engineering Laboratory,
University of Florida, Gainesville.
(TC233.5 .F64)

The coastal protection situation (1959) at Pompano Beach, Florida, including groin structures is discussed.

Key Words - Impermeable/Short/Adjustable/High/Low/Erosion/Accretion/

Schijf, J. B., Journal of the Waterways and Harbors Division, ASCE, Vol. 85, No. WW1, Pt. 1, Mar., 1959, pp. 1-12.

The engineering basis of coastal protection is discussed with emphasis on the Netherlands seacoast. The paper supports a shift in the old philosophy of protection by groins and seawalls to a new philosophy of protection by sand fill.

Key Words - System/Low/Terminal/Artificial-fill/Europe/

"Unfinished Business - New Jersey Groin Project Stalled by Winter"

5904GR0001

Anonymous, Asphalt Institute Quarterly, Apr., 1959, pp. 7-8. (V.F. 928 4/59)

Three types of structural designs used in the construction of asphalt groins are presented along with a commentary on construction procedures.

Key Words - Low/Structural-design/Const-procedure/S. Atlantic/
N. Atlantic/Impermeable/Asphalt/

"Behavior of Sand-Asphalt Groins at Ocean City, Maryland"

5905GR0001

Jachowski, R. A., U. S. Army Beach Erosion Board Miscellaneous Paper, No. 2-59, Washington, D. C., May, 1959. (BEB M.P. 2-59)

Maryland north from Ocean City to Delaware has had a history of erosion over the past century. In 1954 and 1955 the Maryland State Roads Commission desired to stabilize this shore, and with limited funds available decided to experiment with sand-asphalt construction for a groin system. Construction procedure, the behavior of the beach and groins are discussed; illustrative and photographic coverage included. Subsequent surveys showed that the groins were repeatedly undermined and settled or were destroyed. Net effect of the entire groin system at the end of 3 years was negligible.

Key Words - 1950-1954/1955-1959/Asphalt/Field/System/Low/Impermeable/
N. Atlantic/Erosion/Misc-plan/Scour/Accretion/Const-procedure/Structural-design/

"Laboratory Study of the Effect of Groins
on the Rate of Littoral Transport: Equip-
ment Development and Initial Tests"
Savage, R. P., U. S. Army Beach Erosion
Board Technical Memorandum, No. 114, June,
1959, 56 pp.

5906GR0001

Waves were generated to impinge obliquely on a sand beach in an outdoor wave test basin. Longshore movement of sand due to wave action, with and without groins, was measured. Procedures and equipment for trapping, measuring and transporting entrapped sand to the updrift end of the beach are described. Test results, such as cumulative weight of sand movement relative to test duration, relative weight of sand trapped in different profile zones and physical changes to profile and bottom contours, are graphically presented. Rate of sand movement relative to applied wave energy is compared with values obtained by other investigators. Rates determined from small-scale laboratory data fall below an extrapolated curve derived from data from field tests. No positive conclusions are drawn; further testing is underway.

Key Words - Experimental/Model/System/ERosion/Accretion/Impermeable/

"Shore of New Jersey - Barnegat Inlet to
Cape May Canal, Beach Erosion Control Study"
U. S. Army Corps of Engineers, House Docu-
ment No. 208, 86th Congress, 1st Session,
Aug., 1959.

5908GR0001

Key Words - House Document/Not Annotated/

"Shore Between Pemberton Point and Cape
Cod Canal, Mass., Beach Erosion Control
Study"
U. S. Army Corps of Engineers, House Docu-
ment No. 272, 86th Congress, 2nd Session,
Oct., 1959.

5910GR0001

Key Words - House Document/Not Annotated/

"Coast Erosion and Defence"
Russell, R. C. H., Department of Scien-
tific and Industrial Research Hydraulics

6000GR0001

Among nine questions and answers on coast erosion and defense, these are especially pertinent to groins: (1) how should the designer decide whether or not groins are desirable in a particular case, and how should he decide on the spacing, length, height, profile, and orientation? (2) what are the relative merits of permeable and impermeable groins? (3) what causes lee side scour, and how should the problem be dealt with by the designer of sea defenses?

Key Words - Model/Experimental/Europe/Accretion/Misc-plan/Low/Short/
System/Erosion/Scour/Artificial-fill/Mobbs/Permeable/
Impermeable/1960-1964/

"Protection of the West Beach of Sylt Island by Flat Groins" 6000GR0002
Zischer, F. F., Bitumen, Heidelberg, No.
8/9, 1960, p. 190.

Key Words - Not Annotated/

"Wessagussett Beach, Weymouth, Mass." 6002GR0001
U. S. Army Corps of Engineers, House
Document No. 334, 86th Congress, 2nd
Session, Feb., 1960.

Key Words - House Document/Not Annotated/

"A Contractor Battles the Tides" 6004GR0001
Eastburn, H. C., Shore and Beach,
American Shore and Beach Preservation
Assoc., Vol. 28, No. 1, Apr., 1960,
p. 29. (TC330 .Am3)

Repair and extension of groins at Bethany Beach, Delaware, were undertaken by a low-bid company. Construction procedures and cost of construction are presented.

Key Words - N. Atlantic/Artificial-fill/System/Erosion/Timber/Steel/
Rubble-mound/Economics/Const-procedure/Maintenance/1955-
1959/1960-1964/Impermeable/Accretion/

Reinalda, R., Proceedings of Seventh Conference on Coastal Engineering, Council on Wave Research of the Engineering Foundation, Aug., 1960, pp. 318-325.
(TC203 .C6)

Erosion problems around the Thyboron Channel on the west coast of Denmark were studied in models. Analogs and differences between actual field history and model studies of erosion and accretion due to groin construction are presented.

Key Words - Model/Experimental/Field/Erosion/Accretion/Scour/Const-problems/1900-1949/Europe/Long/1960-1964/

"The Development of Coastal Profiles on a Receding Coast Protected by Groynes"
Sorensen, T., Proceedings of the Seventh Conference on Coastal Engineering, ASCE, Aug., 1960, Vol. 2, pp. 836-846.
(TC203 .C6)

6008GR0002

This paper analyzes the longshore sand transport by waves and currents on natural coasts outside the breaker zone. A tentative expression for the transport capacity is established and applied to the problem of the effect of groins on the development of the coast profiles. It is shown that results are consistent with observed development of the Danish North Sea Coast at Thyboron, which has been protected by groins and closely observed for 60 years.

Key Words - Theory/Field/System/Transport-normal/Europe/Erosion/

"Shoreline Advancement by Sea Wall and Groynes at Cochin"
Hiranandani, M. G., and Gole, C. V., Proceedings of the Seventh Conference on Coastal Engineering, Vol. 2, Aug., 1960, pp. 860-871. (TC203 .C6)

6008GR0003

This report on the groins and seawall at Cochin, India, presents the following conclusions: (i) Groins 200 feet long are to be preferred to groins 150 feet long. (ii) Spacing between groins should not exceed three times the groin length. (iii) Heavy stones, used as seawall armor on a core of smaller stones, result in decreased rate of maintenance. (iv) Piles at toe of seawall do not give extra protection

to the seawall. (v) Inclined groins do not commend themselves for adoption on this coast.

Key Words - Rubble-mound/Piling/Permeable/Impermeable/System/Misc-plan/Const-procedure/Erosion/Short/Accretion/1955-1959/Field/Model/

"Coastal Protection Works and Related Problems in Japan"

6008GR0004

Hom-ma, M., and Horikawa, K., Proceedings of the Seventh Conference on Coastal Engineering, Council on Wave Research of the Engineering Foundation, Aug., 1960, pp. 904-930. (TC203 .C6)

This extensive discussion of coastal engineering in Japan includes a survey of the types of protective works, including groins.

Key Words - Asia/Field/Concrete/Short/

"Beach-Rehabilitation by use of Beach Fills and further Plans for the Protection of the Island of Norderney"

6008GR0005

Kramer, J., Proceedings of the Seventh Conference on Coastal Engineering, ASCE, Aug., 1960, Vol. 2, pp. 847-859. (TC203 .C6)

This paper discusses the placement of artificial nourishment on a heavily groined beach on the island of Norderney, Germany. Changes in beach profiles are given following the 1951-1952 filling operation. Also presented is a plan for future fill operations.

Key Words - System/Erosion/Artificial-fill/Field/Europe/1950-1954/

"San Diego County, Calif., Appendix IV, Phase 2, Beach Erosion Control Study"
U. S. Army Corps of Engineers, House Document No. 456, 86th Congress, 2nd Session, Sept., 1960.

6009GR0001

Key Words - House Document/Not Annotated/

"Design and Construction of the Seal
Beach Groin"

6010GR0001

Nicol, F. E., Shore and Beach, American
Shore and Beach Preservation Assoc.,
Vol. 28, No. 2, Oct., 1960, pp. 24-26.
(TC330 .Am3)

Due to increased deterioration of Seal Beach, California, state and federal aid was recommended by the Corps of Engineers. A single groin, deemed the most economical solution, was constructed.

This concise, though comprehensive, article presents the structural design, constructive procedure, and an especially pertinent conclusion enumerating construction and engineering problems.

Key Words - Single/Impermeable/Concrete/Artificial-fill/Structural-
design/Erosion/Const-procedure/Accretion/Timber/Piling/
Const-problems/California/1955-1959/1960-1964/Field/

"Coastal Protection in Massachusetts"

6010GR0002

MacKinnon, R. B., and Hannon, J. R.,
Shore and Beach, American Shore and Beach
Preservation Assoc., Vol. 28, No. 2, Oct.,
1960, pp. 37-38. (TC330 .Am3)

Spur groins constructed normal to jetties on the updrift side near the low water line were successful in stopping scour along the jetties. In a short time, the foreshore built out to where the spur was placed. Author points out these groins may not be a solution for all similar instances.

Key Words - Rubble-mound/Erosion/Accretion/Impermeable/Misc-plan/
N. Atlantic/Field/1960-1964/Short/Scour/Spur/

"Über den Einfluss von Strandbuhnen auf
die Sandwanderung an Flachküsten"

6100GR0001

Gutsche, H., Mitteilungen des Franzius-
Instituts für Grund- und Wasserbau der Tech-
nischen Hochschule Hannover, Vol. 20,
1961, pp. 74-211.

Translated Title: "On the Influence of Groins on Sand Movement
along Low-Lying Coasts"

Key Words - Not Annotated/

"A Scientific Basis for Design of Groyne Systems"

6100GR0002

Hoyle, J. W., and King, G. T., The Surveyor, and Municipal and County Engineer, London, Vol. 120, 1961, pp. 619-621.

Key Words - Not Annotated/

"Sea Defence Groynes - 4"

6101GR0001

Oliver, A. C., Civil Engineering, London, Vol. 56, No. 654, Jan., 1961, pp. 87-90.

Key Words - Not Annotated/

"Lake Erie Shore Line from the Michigan-Ohio State Line to Marblehead, Ohio, Beach Erosion Control Study"

6101GR0002

U. S. Army Corps of Engineers, House Document No. 63, 87th Congress, 1st Session, Jan., 1961.

Key Words - House Document/Not Annotated/

"Behavior of Beach Fills in New England"

6102GR0001

Perdikis, H. S., Journal of the Waterways and Harbors Division, ASCE, Vol. 89, No. WW1, Paper No. 2744, Feb., 1961.

A study of behavior of fills placed on 10 New England beaches is presented. Quantitative determinations of changes in volumes of the fill, high and low water shoreline positions, and slopes were made. Groins, single and in systems, were built to help retain fill.

Key Words - N. Atlantic/Artificial-fill/Impermeable/Rubble-mound/
Erosion/Accretion/Single/System/Field/

"Groins on the Shores of the Great Lakes"

6105GR0001

Lee, C. E., Journal of the Waterways and Harbors Division, ASCE, Vol. 87, No. WW2, Paper 2819, May, 1961, pp. 89-111.

Groins are not a cure-all for shore erosion problems; faulty design or misplacement can create additional problems or increase existing problems. This comprehensive paper summarizes data on existing groins, changes in lake levels, other processes, notes on design of groins for the Great Lakes, and some indication of research and costs.

Key Words - Great Lakes/Permeable/Impermeable/Concrete/S. M. Wood/
Timber/Steel/Piling/Rubble-mound/Misc-plan/Geometric-
shapes/System/T-groins/Scour/Economics/Field/1960-1964/
Structural-design/

"Palm Beach County, Florida, from Martin
County Line to Lake Worth Inlet and from
South Lake Worth Inlet to Broward County
Line, Beach Erosion Control Study"
U. S. Army Corps of Engineers, House Docu-
ment No. 164, 87th Congress, 1st Session,
May, 1961. 6105GR0002

Key Words - House Document/Not Annotated/

"New Jersey Coast of Delaware Bay from Cape
May Canal to Maurice River, Beach Erosion
Control Study"
U. S. Army Corps of Engineers, House Docu-
ment No. 196, 87th Congress, 1st Session,
June, 1961. 6106GR0001

Key Words - House Document/Not Annotated/

"Amelia Island, Florida, Beach Erosion
Control Study"
U. S. Army Corps of Engineers, House Docu-
ment No. 200, 87th Congress, 1st Session,
June, 1961. 6106GR0002

Key Words - House Document/Not Annotated/

"Coast Protection -- Groynes"
Hoyle, J. W., and King, G. T., Journal of the
Institution of Municipal Engineers, Vol. 88,
No. 6, June, 1961. 6106GR0003

Key Words - Not Annotated/

"A Study of Groins and Their Function as
Hydraulic Structures"
Pretious, E. S., and Vollmer, E., Technical 6107GR0001

Note No. 35, Department of Civil Engineering, University of British Columbia, Vancouver, Canada, July, 1961. (TC426.B2tn)

In a systematic laboratory model study of groin structures, lengths, crest heights and slopes, shapes and slopes of groin heads, side slopes, ratios of groin spacings to lengths, ratios of crest heights to water depths, angles of inclination to the waterline, and various degrees of permeability of groins were investigated. All results are fully illustrated and qualitative.

Key Words - Experimental/Model/Terminal/System/Scour/Erosion/
Accretional/Shoaling/Structural-design/Single/Misc-plan/
T-groins/Long/Short/Permeable/Impermeable/L-groins/Theory/

"Behavior of Beach Fill and Borrow Area
at Prospect Beach, West Haven, Connecticut"
Vesper, W. H., U. S. Army, Beach Erosion
Board Technical Memorandum, No. 127, Aug.,
1961, 29 pp.

6108GR0001

Comparative survey and sample data are analyzed to determine behavior of beach fill obtained from an offshore borrow source. A groin system and feeder beach were also included in the project. The project has provided a protective beach over a 3-year period equal to or greater than minimum dimensions required. Average annual losses have been about 13,000 cubic yards per year, and the feeder beach has performed satisfactorily. Size and sorting characteristics of the fill material are shown to have been suitable, using Krumbein's method of computed composite curves. Borrow sources, although only 1,000 feet offshore, were suitable for local wave conditions, and shoaling thereof has been limited to silty material. Annual costs have been about \$3.00 per linear foot of shore protected. The groins are effective and have probably reduced fill losses to a degree justifying their construction.

Key Words - N. Atlantic/System/Misc-plan/Accretion/Economics/Rubble-
mound/Impermeable/Field/Low/Long/1955-1959/

"Groins on the Shores of the Great Lakes"
Rayner, A. C., and Rector, R. L., Journal
of the Waterways and Harbors Division, ASCE,
Vol. 87, No. WW4, Nov., 1961, p. 137.

6111GR0001

The authors state that use of permeable groins is not warranted along the Great Lakes because of the deficiency of littoral drift along those shorelines. This short article provides insight on groin

costs, length, and percentage of permeable to impermeable groins on the Great Lakes.

Key Words - Permeable/Impermeable/Short/Long/Economics/Great Lakes/
Artificial-fill/1960-1964/

"The Selsey Coast Protection Scheme"

6112GR0001

Duvivier, J., Journal of the Institution
of Civil Engineers, London, Vol. 20, Dec.,
1961, pp. 481-506. (TC257 .D2)

Because of threatening erosion or inundation or both, a scheme was undertaken to construct protective structures, including groins, on the coast east and west of Selsey Bill, England. This paper gives the history of erosion, trends of littoral transport and currents, sediment supply sources, scheme of protective works, and results after construction.

A new type of articulated groin built with transverse and longitudinal flexibility is discussed, and its satisfactory performance noted. Measures taken to combat erosion beyond the terminal groin are presented.

Key Words - Terminal/Concrete/System/Europe/Piling/Accretion/Erosion/
Field/Timber/1950-1954/1955-1959/1960-1964/Impermeable/
misc-plan/Structural-design/Scour/Maintenance/

"Beach Erosion and Protection Works in
Imazu-Sakano Beach"

6112GR0002

Kubo, M., and Iwasa, N., Coastal Engineer-
ing in Japan, JSCE, Vol. 4, Dec., 1961,
pp. 103-114.

This article presents the design of protective structures including T-groins constructed of concrete hexa-leg blocks at Imazu-Sakano Beach, Japan.

Key Words - Impermeable/Asia/Concrete/T-groins/Transport-normal/
Structural-design/Misc-plan/System/Economics/Geometric-
shapes/

"Photographs of Sarasota County, Florida,
Showing Groin Installation"

6200GR0001

Budd, W., 1962, Unbound collection. (V.S. 1772)

Photos show a Sarasota County, Florida beach before and after construction of Budd dog-bone groins, 1961-1962.

Key Words - Budd/Photographic/S. Atlantic/Permeable/

"Behavior of Beach Fills in New England" 6200GR0002
Perdikis, H. S., Transactions of the
American Society of Civil Engineers, Vol.
127, Part 4, Paper No. 3337, 1962, pp.
292-328.

A study of the behavior of fills placed on 10 New England beaches is presented. Quantitative determinations of changes in volumes of the fill, high and low water line positions, and beach slopes were made. The groins, in systems and singly, were either pre-existing or built to help retain the fill.

Key Words - N. Atlantic/Artificial-fill/Impermeable/Rubble-mound/
Erosion/Accretion/Single/System/Field/

"Groynes as Barriers to Movement of Beach 6200GR0003
Material"
Hoyle, J. W., and King, G. T., The Surveyor,
and Municipal and County Engineer, London,
Vol. 121, 1962, pp. 601-603.

Key Words - Not Annotated/

"Belle Pass to Raccoon Point, Louisiana, 6202GR0001
Beach Erosion Control Study"
U. S. Army Corps of Engineers, House Docu-
ment No. 338, 87th Congress, 2nd Session,
Feb., 1962.

Key Words - House Document/Not Annotated/

"Asphalt Groins" 6204GR0001
Asphalt Institute, Asphalt in Hydraulic
Structures, 3rd ed., Manual Series No. 12,
Apr., 1962, pp. 95-103. (TN853 .A4)

Structural design features and modes of construction are presented.

Key Words - Asphalt/Low/Short/Const-procedure/Structural-design/
Impermeable/

"Use of Concrete for Shore Protection" 6204GR0002
Sellner, E. P., Shore and Beach, American
Shore and Beach Preservation Assoc., Vol.
30, No. 1, Apr., 1962, pp. 18-24.
(TC330 .Am3)

A general discussion of groins is included in this article. Groin design, purpose, spacing and length are discussed. Decision factors as to whether or not to use groins are presented.

Key Words - Impermeable/Permeable/Concrete/Great Lakes/Structural-
design/Geometric-shapes/Single/Field/Erosion/Accretion/
1960-1964/

"Asphalt in Beach Erosion Control Structures" 6204GR0003
Smith, D., Shore and Beach, American
Shore and Beach Preservation Assoc., Vol.
30, No. 1, Apr., 1962, pp. 31-34.

Hot-mix asphalt concrete specifications for groins are discussed. Examples of a typical cross-section and plan are given. Suggested construction procedures and basic considerations for asphaltic groin design are presented.

Key Words - Asphalt/Low/Short/Const-problems/Misc-plan/Structural-
design/N. Atlantic/Const-procedures/1960-1964/Impermeable/

"Coast Protection - Groyne Systems" 6204GR0004
Hoyle, J. W., and King, G. T., Surveyor
and Municipal and County Engineer, London,
Vol. 121, No. 3647, Apr., 1962, pp. 575-
579. (TC535 .H9)

Relationship between high water lines, groin spacing, and profile of a groin system is demonstrated experimentally. The results of this procedure were used in the construction of a groin system on the Norfolk coast, England.

This article suggests that design criteria for groin systems can be determined through experimental analysis. The design of a groin system should be carried out in two operations, that relating to the spacing and location upon the plan, and that relating to the shape and levels of the profile.

Key Words - Experiment/Theory/Field/Europe/System/Permeable/High/
Low/Short/Long/Structural-design/Impermeable/Accretion/
Erosion/1955-1959/1960-1964/

"Virginia Beach, Virginia, Cooperative Beach Erosion Control Study" 6204GR0005
U. S. Army Corps of Engineers, House Document No. 382, 87th Congress, 2nd Session, Apr., 1962.

Key Words - House Document/Not Annotated/

"Shore of Sheffield Lake Community Park, Ohio, Beach Erosion Control Study" 6205GR0001
U. S. Army Corps of Engineers, House Document No. 414, 87th Congress, 2nd Session, May, 1962.

Key Words - House Document/Not Annotated/

"Carolina Beach and Vicinity, North Carolina" 6205GR0002
U. S. Army Corps of Engineers, House Document No. 418, 87th Congress, 2nd Session, May, 1962.

Key Words - House Document/Not Annotated/

"Shore of the State of New Hampshire Beach Erosion Control Study" 6205GR0003
U. S. Army Corps of Engineers, House Document No. 416, 87th Congress, 2nd Session, May, 1962.

Key Words - House Document/Not Annotated/

"A Model Study of the Behavior of Beaches
and Groynes"
Kemp, P. H., Journal of the Institution
of Civil Engineers, London, Vol. 22,
1962, pp. 191-210. (TC535 .K4)

6206GR0001

This paper reviews factors which influence the shape of the natural shoreline in the absence of groins. A series of model experiments is then described; three types of impermeable groins were subjected to a cycle of accretion, depletion, and recovery, under the action of waves of different characteristics. Attention is drawn to the effect of the alignment and type of groin on the rate of longshore transport, littoral currents, scour, and shoreline orientation. Each arrangement of the groins is seen to possess characteristic advantages and disadvantages which can influence the choice of groin and its alignment in given circumstances. Within the limitations of the groin experiments it would seem that the shoreline orientation and rate of longshore transport can be varied by modifications to groin type and alignment. Shoreline reorientation can reduce the littoral current and consequently reduce the scour. By an appropriate choice of groin type and alignment, it should be possible to orient the shoreline in such a way that the effects of storm attack are reduced.

Key Words - Experimental/Model/Accretion/ERosion/Transport-normal/
Scour/Structural-design/High/Low/System/Long/Short/
Impermeable/

"Coast of Southern California - Special
Interim Report on the Ventura Area,
Cooperative Beach Erosion Control Study"
U. S. Army Corps of Engineers, House Docu-
ment No. 458, 87th Congress, 2nd Session,
June, 1962.

6206GR0002

Key Words - House Document/Not Annotated/

"Raritan Bay and Sandy Hook Bay, New Jersey"
U. S. Army Corps of Engineers, House Docu-
ment No. 464, 87th Congress, 2nd Session,
June, 1962.

6206GR0003

Key Words - House Document/Not Annotated/

"The Nearshore Movement of Sand at Durbin"

6207GR0001

Kinmont, A., U. S. Army Beach Erosion
Board Bulletin, Vol. 16, July, 1962,
pp. 22-23. (BEB Vol. 16)

The impermeability of groins at Durbin, South Africa, have caused sand at their ends to be eroded. Due to an increase of water depth at their ends, the normal gradients of the beach have been disturbed. Instead of accumulating on the southern face of the groin - the littoral transport being northerly - the sand is forming a central spit, while the areas on both sides of the groins are being severely eroded.

Key Words - Africa/Field/Erosion/Accretion/Impermeable/System/
1950-1954/1955-1959/Scour/

"The Protection and Preservation of the
Atlantic Shore Front of the State of
New York" 6207GR0002

Anonymous, Final Report, July, 1962, State
of New York Temporary State Commission on
Protection and Preservation of the
Atlantic Shore Front.

Recurring hurricanes and seasonal storms have caused destruction along the Atlantic shoreline of New York State. Shore protection measures, including groin systems, are reviewed.

Key Words - System/Photographic/N. Atlantic/Erosion/Accretion/

"Aerial Photographs, Plum Island,
Massachusetts" 6208GR0001
U. S. Army Corps of Engineers, Aug., 1962,
New England Division, Unpublished Report.
(V.F. 1772 8/62)

Seventeen 8- by 10-inch oblique aerial photographs showing the August 1962 condition of the Plum Island jetty and a four-component rubble-mound groin system.

Key Words - N. Atlantic/Photographic/Field/System/Rubble-mound/
Impermeable/1960-1964/

"San Juan, Puerto Rico, Beach Erosion
Control Study" 6209GR0001

U. S. Army Corps of Engineers, House
Document No. 575, 87th Congress, 2nd Session,
Sept., 1962.

Key Words - House Document/Not Annotated/

"Fort Macon - Atlantic Beach and Vicinity,
North Carolina" 6209GR0002

U. S. Army Corps of Engineers, House Docu-
ment No. 555, 87th Congress, 2nd Session,
Sept., 1962.

Key Words - House Document/Not Annotated/

"Clark Point, New Bedford, Massachusetts,
Beach Erosion Control Study" 6209GR0003

U. S. Army Corps of Engineers, House Docu-
ment No. 584, 87th Congress, 2nd Session,
Sept., 1962.

Key Words - House Document/Not Annotated/

"Beach Erosion Control Report on Cooperative
Study of Virginia and Biscayne Keys, Florida" 6209GR0004

U. S. Army Corps of Engineers, House Docu-
ment No. 561, 87th Congress, 2nd Session,
Sept., 1962.

Key Words - House Document/Not Annotated/

"Sheet Steel Piling for Shore Protection
Structures" 6210GR0001

Hickey, R. E., Shore and Beach, American
Shore and Beach Preservation Assoc., Vol.
30, No. 2, Oct., 1962, pp. 18-22.

Design and examples of shore protection structures, including
groins, constructed with sheet steel piling are presented. Some
structures are built with a combination of materials. For instance,
parallel walls of sheet steel piling may be filled with rock and
capped with concrete.

Key Words - Steel/Piling/Misc-plan/Concrete/Rubble-mound/Great Lakes/
Structural-design/Impermeable/

"San Gabriel River to Newport Bay, Orange County, California, Appendix V, Phase II, Beach Erosion Control Study"
U. S. Army Corps of Engineers, House Document No. 602, 87th Congress, 2nd Session, Oct., 1962.

Key Words - House Document/Not Annotated/

Review of Beach Erosion and Storm Tide Conditions in Florida 1961-1962"
Bruun, P., Morgan, W. H., and Purpura, J. A., Engineering Progress at the University of Florida, Vol. 16, No. 11, Tech. Progress Report No. 13, Nov., 1962, Florida Engineering and Industrial Experiment Station, Gainesville, 104 pp. (TC203 .F62 V. 16 no. 11)

A pictorial review of erosion and Florida beach conditions shows that groins have caused serious downdrift erosion. Examples are cited.

Key Words - Photographic/S. Atlantic/Timber/Impermeable/Permeable/
Erosion/Artificial-fill/System/Field/Rubble-mound/Budd/
Adjustable/Concrete/Piling/High/Low/Accretion/

"An Investigation into the Effectiveness of Various Types of Groynes on Seaford Beach"
Anonymous, Report No. EX218, 1963, Wallingford, Berkshire, England. (TC57 W34r For Official Use Only)

Key Words - Not Annotated/

"Construction Works for the Protection of the Coasts"
Spataru, A., Studii de Hidraulica, Comitetul de stat al Apelor Institutul de

Several types of constructions for the protection of the coast are presented with information concerning permeable and impermeable transverse structures. (In Romanian with an English abstract.)

Key Words - Permeable/Impermeable/

"Aerial Photographs of Wallis Sand State
Beach, Rye, New Hampshire"
U. S. Army Corps of Engineers, June, 1963,
New England Division, Unpublished Reprot.
(V.F. 1772 9/12/63)

Six ground photos show construction stages of a stone groin.
Three oblique aerial photographs show the completed groin.

Key Words - 1960-1964/Single/Field/Long/High/Rubble-mound/
N. Atlantic/Impermeable/Photographic/

"Emergency Measures to Combat Beach Erosion" 6306GR0002
Bruun, P., and Purpura, J. A., Engineering
Progress at the University of Florida, Vol.
17, No. 6, Leaflet No. 158, June, 1963,
Florida Engineering and Industrial Experi-
ment Station, Gainesville, 26 pp. (TC203
.F62 v. 17 no. 6)

Among the emergency measures, the repair of groins damaged
during storm action is discussed.

Key Words - Scour/ERosion/Maintenance/Artificial-fill/Adjustable/
Rubble-mound/Piling/

"Coastal Engineering Structures" 6307GR0001
Hall, J. V., Jr., U. S. Army Beach Erosion
Board Annual Bulletin, Vol. 17, July, 1963,
pp. 16-37. (BEB Vol. 17)

This paper describes the physical characteristics of basic
coastal engineering structures in general use; the behavior of indi-
vidual structures and their behavior when grouped as a system. Also

described is a typical example of planning for coastal engineering works.

Groin structures are defined, the different types and their uses discussed; structural design and examples are given.

Key Words - Timber/Concrete/Steel/Rubble-mound/Structural-design/
Low/Permeable/Impermeable/High/Long/Short/Single/System/
N. Atlantic/Field/Accretion/Erosion/Terminal/Texas Gulf/

"Review of German Experience on Coastal
Protection by Groins"

6307GR0002

Petersen, M., U. S. Army Beach Erosion
Board Annual Bulletin, Vol. 17, July,
1963, pp. 38-54. (BEB Vol. 17)

This report contains sections on the evaluation of German documentation on groins, a chronologic survey of the literature prior to 1960, the effects of groins through experience, and a bibliography on German literature on groins.

Key Words - 1900-1949/1950-1954/1955-1959/1960-1964/Misc-plan/System/
Timber/Piling/Steel/Rubble-mound/Concrete/Asphalt/
Economics/

"Structures for Shore Protection"

6307GR0003

Hall, J. V., Civil Engineering, ASCE,
Vol. 33, No. 7, July, 1963, pp. 38-41.

The most widely used and the best solution to the beach erosion problem is the artificially constructed and nourished beach. Groins are the most important structures for enlargement and stabilization of beaches.

Key Words - Permeable/Impermeable/Low/High/System/Artificial-fill/

"Coastal Protection for Florida"

6310GR0001

Bruun, P., and Manohar, M., Engineering
Progress at the University of Florida,
Bulletin Series No. 113, Vol. 17, No. 8,
Aug., 1963, Engineering and Industrial
Experiment Station, Gainesville, 56 pp.
(TC203 .F62 v. 17)

Extensive coverage is given to protective structures constructed along the Florida coast. Design criteria of groins are discussed including length, spacing, height, and permeability. Charts summarize types of shore protection structures as a function of specific beach conditions.

Key Words - Accretion/Erosion/S. Atlantic/Artificial-fill/System/
Permeable/Impermeable/Adjustable/Low/Misc-plan/Europe/
Timber/Rubble-mound/Structural-design/Asphalt/T-groins/
Scour/Piling/Z-groins/

"Stabilization of Shingle Alluvial Shores by Groins of Full Profile" 6400GR0001

Zhdanov, A. M., U. S. Army Coastal Engineering Research Center Bulletin, Vol. 1, 1964, pp. 32-40. (CERC Bull. Vol. 1)

A formula is presented for determining dimensions in the design of groins. Model tests are correlated with observations in the prototype. A design example is presented.

Key Words - Field/Model/Experimental/Structural-design/Theory/Asia/
Short/Impermeable/System/Low/

"Effects of Large Structures on the Ohio Shore of Lake Erie" 6400GR0002

Hartley, R. P., State of Ohio Department of Natural Resources, Division of Geological Survey, Report of Investigations No. 53, 1964, 30 pp. (QE151 .037r No. 53)

Large structures such as breakwaters and jetties which extend into Lake Erie are reviewed. Effects of the structures and their maintenance are given along with good aerial photographic coverage.

Key Words - Photographic/ERosion/Accretion/Maintenance/Great Lakes/

Oceanographical Engineering 6400GR0003

Wiegel, R. L., Prentice-Hall International Series in Theoretical and Applied Mechanics, Fluid Mechanics Series, Prentice-Hall Inc., Englewood Cliffs, N. J., 1964, 532 pp. (GC201 W5)

Part of Chapter 17 in this textbook discusses the use of groins; a good introduction to the subject.

Key Words - Permeable/Impermeable/High/Low/Adjustable/Z-groins/
Corner-groins/T-groins/Structural-design/Asphalt/
Artificial-fill/Misc-plan/Scouring/Theory/

"Proteccao da Costa Contra a Erosao
Maritima e Formacae de Praias de Arcia -
dois Problemas na Costa de Mocambique"
Gomes, N., Fomento, Vol. 2, No. 2, 1964,
pp. 73-88. 6400GR0004

Key Words - Not Annotated/

"Stability of Beaches Using Groins" 6406GR0001
Ishihara, T., and Sawaragi, T., Proceed-
ings of Ninth Conference on Coastal Eng-
ineering, ASCE, June, 1964, pp. 299-303.

The authors conducted a field investigation on the stability of beaches, using groins along the Imazu and Sakano Coasts in Tokushima, Japan. Based on the survey of coastal configuration between groins and on the estimation of the amount of littoral drift in the case of no structure, the storage capacity of permeable and impermeable groins was determined. It was found that the groins have to be designed in types, lengths and intervals so that equal amounts of littoral transport along the coast may be secured. Conclusions are presented.

Key Words - T-groins/Long/Permeable/Impermeable/Accretion/ERosion/
Asia/Field/Misc-plan/Short/Theory/

"Hunting Island Beach, South Carolina" 6407GR0001
U. S. Army Corps of Engineers, House Docu-
ment No. 323, 88th Congress, 2nd Session,
July, 1964.

Key Words - House Document/Not Annotated/

"Atlantic City, New Jersey Beach Erosion 6407GR0002
Control Study"
U. S. Army Corps of Engineers, House Docu-

ment No. 325, 88th Congress, 2nd Session,
July, 1964.

Key Words - House Document/Not Annotated/

"Falmouth, Massachusetts"
U. S. Army Corps of Engineers, House Docu-
ment No. 326, 88th Congress, 2nd Session,
July, 1964.

6407GR0003

Key Words - House Document/Not Annotated/

"A Pictorial History of Selected Structures
Along the New Jersey Coast"
Vesper, W. H., and Essick, M. G., U. S.
Army Coastal Engineering Research Center
Miscellaneous Paper, No. 5-64, Oct., 1964,
99 pp. (CERC M.P. 5-64)

6410GR0001

An extensive pictorial history of selected shore protection struc-
tures, this publication records relative effectiveness of the various
structures, including groins, from 1929 to 1961.

Key Words - N. Atlantic/Haupt/System/Timber/Accretion/ERosion/Imper-
meable/Low/Long/Short/Maintenance/Rubble-mound/Misc-plan/
Steel/Piling/High/Photographic/1900-1949/1960-1964/Single/
Concrete/

"Protection des Cotes Contre L'Erosion
Maritime et Formation des Plages de
Sable"

6410GR0002

Gomes, N., Hoville Blanche, Vol. 19,
No. 6, Oct., 1964, pp. 693-705.

Key Words - Not Annotated/

"Coastal Protection Procedures with
Reference to Conditions in Florida"
Bruun, P., Engineering Progress at the
University of Florida, Vol. 18, No. 12,
Bull. Series No. 118, Dec., 1964, Florida

6412GR0001

This article presents ordinances which govern shore protection measures for the city of Pompano, Florida. Included are codes for the maintenance and design of groins.

Key Words - Legal/Adjustable/S. Atlantic/Structural-design/Maintenance/

"Groins from Wisconsin on Lake Michigan" 6500GR0001
Essick, M. G., and Berg, D. W., U. S.
Army Coastal Engineering Research Center,
2 Vols., 1965, Unpublished Report.

Principally a historical review, report contains photographs, locations, and evaluations of permeable groins located on Lake Michigan in the state of Wisconsin.

Key Words - Permeable/Impermeable/System/Field/Great Lakes/Steel/
Piling/Structural-design/Concrete/Photographic/Long/Short/
High/Low/Maintenance/Timber/Erosion/Accretion/Rubble-mound/
1900-1949/1950-1954/1955-1959/1960-1964/1965-1969/

"Permeable Groins from Illinois on Lake Michigan" 6500GR0002
Essick, M. G., and Berg, D. W., U. S.
Army Coastal Engineering Research Center,
2 Vols., 1965, Unpublished Report.

A pictorial-historic review, this report includes locations, oblique aerial photographs, and conditions of permeable groins found along Lake Michigan in Illinois.

Key Words - Permeable/Great Lakes/Concrete/Structural-design/S. M.
Wood/Timber/Photographic/Maintenance/Erosion/Accretion/
System/Steel/Long/Short/Impermeable/Adjustable/Rubble-
mound/Field/Single/1900-1949/1950-1954/1955-1959/1960-
1964/1965-1969/

"Permeable and Semipermeable Groins from Ohio on Lake Erie" 6500GR0003
Essick, M. G., and Berg, D. W., U. S. Army

Coastal Engineering Research Center,
2 Vols., 1965, Unpublished Report.

Existing shore protection structures are listed as found on Lake Erie in the state of Ohio. U. S. House Documents give conditions of these structures that include permeable and semipermeable groins. Photographs, location of study sites, and evaluation of groin conditions are given.

Key Words - Field/Accretion/Erosion/Permeable/Timber/Concrete/Piling/
Steel/Great Lakes/Rubble-mound/Short/Long/Maintenance/
High/Low/S. M. Wood/1900-1949/1950-1954/1955-1959/1960-
1964/1965-1969/Structural-design/System/

"Report to the Twenty-First International
Navigation Congress"

6500GR0004

Shirdan, L., Twenty-First International
Navigation Congress, Permanent Interna-
tional Association of Navigation Congresses,
Brussels, Belgium, Section 2 - Ocean Navi-
gation, Subject 1, 1965, pp. 101-110.
(TC5 .In8r)

Gabions used in the construction of a T-groin on the Mediterranean Sea are briefly discussed. The author concludes that it would be worthwhile to find adequate methods for the design and erection of future gabion-made groins.

Key Words - Misc-materials/T-groins/Asia/Geometric-shapes/Single/

"New Coastal Works at Nahariya (Israel)"
Fried, I. C. E., The Dock and Harbour
Authority, London, Vol. 45, Feb., 1965,
pp. 323-326. (TC203 .D637)

6502GR0001

A system of T-groins was constructed on the Israeli coastline of the Mediterranean Sea to improve bathing conditions. Design and economics of the project are given.

Key Words - T-groins/Erosion/Rubble-mound/Low/Structural-design/Asia/
Economics/Impermeable/System/Misc-plan/

"Westerly, Rhode Island"

6502GR0002

U. S. Army Corps of Engineers, House Document No. 85, 89th Congress, 1st Session, Feb., 1965.

Key Words - House Document/Not Annotated/

"Ocracoke Island, North Carolina"

6503GR0001

U. S. Army Corps of Engineers, House Document No. 109, 89th Congress, 1st Session, Mar., 1965.

Key Words - House Document/Not Annotated/

"Atlantic Coast of Long Island, Fire Island Inlet and Shore Westerly to Jones Inlet, New York"

6503GR0002

U. S. Army Corps of Engineers, House Document No. 115, 89th Congress, 1st Session, Mar., 1965.

Key Words - House Document/Not Annotated/

"Waikiki Beach, Oahu, Hawaii; Beach Erosion Control Study"

6503GR0003

U. S. Army Corps of Engineers, House Document No. 104, 89th Congress, 1st Session, Mar., 1965.

Key Words - House Document/Not Annotated/

"Haleiwa Beach, Oahu, Hawaii, Beach Erosion Control Study"

6503GR0004

U. S. Army Corps of Engineers, House Document No. 107, 89th Congress, 1st Session, Mar., 1965.

Key Words - House Document/Not Annotated/

"Emergency Methods to Combat Beach Erosion"

6504GR0001

Bruun, P., and Purpura, J. A.; The Dock and Harbour Authority, London, Vol. 45, No. 534, Apr., 1965, pp. 391-396.

Among emergency measures discussed, the repair procedures of groins damaged during storm action is given.

Key Words - Scour/Erosion/Maintenance/Artificial-fill/Adjustable/Rubble-mound/Piling/

"Staten Island, Fort Wadsworth to Arthur Kill, New York, Beach Erosion Control Study" 6505GR0001

U. S. Army Corps of Engineers, House Document No. 181, 89th Congress, 1st Session, May, 1965.

Key Words - House Document/Not Annotated/

"Perth Amboy, New Jersey Beach Erosion Control Study" 6505GR0002

U. S. Army Corps of Engineers, House Document No. 186, 89th Congress, 1st Session, May, 1965.

Key Words - House Document/Not Annotated/

"City of Evanston, Illinois, Beach Erosion Control Study" 6505GR0003

U. S. Army Corps of Engineers, House Document No. 159, 89th Congress, 1st Session, May, 1965.

Key Words - House Document/Not Annotated/

"Atlantic Coast of New York City from East Rockaway Inlet to Rockaway Inlet and Jamaica Bay, New York" 6506GR0001

U. S. Army Corps of Engineers, House Document No. 215, 89th Congress, 1st Session, June, 1965.

Key Words - House Document/Not Annotated/

"Duval County, Florida"

6508GR0001

U. S. Army Corps of Engineers, House Document No. 273, 89th Congress, 1st Session, Aug., 1965.

Key Words - House Document/Not Annotated/

"Variations in Groin Design"

6510GR0001

Berg, D. W., and Watts, G. M., Coastal Engineering Santa Barbara Specialty Conference, ASCE, Oct., 1965, pp. 763-797. (TC203 .C9S6)

Considering all types of structures used for shore protection purposes, the groin is probably the most widely used and yet it is perhaps the one structure least understood. Groins or groin systems of a particular design may be found where the intended purpose was achieved; however, it is not uncommon to learn of other cases where a similar design was used and negligible benefits resulted. The purpose of this paper is to point out pertinent features of basic types of groins and to illustrate some of the many variations which have been built in the United States.

Key Words - Impermeable/Concrete/Steel/Geometric-shapes/Timber/Asphalt/Rubble-mound/Misc-materials/Permeable/S. M. Wood/Piling/S. Atlantic/N. Atlantic/California/Great Lakes/Alaska/T-groins/Hawaiian Islands/Texas Gulf/Adjustable/Z-groins/Structural-design/Budd/System/Low/Short/Single/High/Long/Erosion/Notched/Field/Photographic/

"Use of Long Groins as Artificial Headlands"

6510GR0002

Dunham, J. W., Coastal Engineering Santa Barbara Specialty Conference, ASCE, Oct., 1965, pp. 755-762. (TC203 .C9S6)

The construction of short groins to trap fillets of sand along coastal beaches characterized by prevailing littoral transport has become a well known practice in coastal engineering. Less common, but often equally important, is the use of long groins to form artificial headlands which trap sand more or less permanently in artificial pocket beaches. The successful use of this long-groin technique at

three Southern California beaches is described, the need for more research as to the effectiveness of such structures is suggested, and other possible uses of long groins are discussed.

Key Words - Long/California/Field/System/Short/Misc-plan/Before 1950/
1955-1959/1950-1954/1960-1964/Single/Impermeable/

"Groins and Effects - Minimizing Liabilities"
Lillivang, O. J., Coastal Engineering Santa
Barbara Specialty Conference, ASCE, Oct., 1965
pp. 749-754. (TC203 .C9S6)

6510GR0003

Groins produce various effects on different shorelines; design data are sparse, so experience and judgment become important design skills to a greater degree than in most engineering problems. Court decisions are described which, from the engineering standpoint, seem opposite in effect where physical conditions were similar. The conclusion is made that the engineer who undertakes projects including seacoast groins needs legal counsel, special engineering knowledge and experience, and a healthy respect for the continuing acceptability of the client's seacoast groins to neighboring proprietors.

Key Words - Legal/California/Erosion/

"Littoral Processes and the Development
of Shorelines"
Inman, D. L., and Frautschy, J. D., Coastal
Engineering Santa Barbara Specialty Confer-
ence, ASCE, Oct., 1965, pp. 511-536.
(TC203 .C9S6)

6510GR0004

Basic principles bearing on the nature of beaches and processes that act to modify them are considered in light of present coastal development demands. A working hypothesis is developed that applies the principle of the conservation of mass to the mechanics of granular-fluid media. This hypothesis appears to have general application to sand transport processes in the littoral zone. Additional research must be done to provide basic information in some critical areas before application can be made with assurance.

Key Words - S. Pacific/Misc-plan/System/Field/Theory/Impermeable/

"Study of Erosion Along Homer Spit and
Vicinity, Kachemak Bay, Alaska"

6511GR0001

Gronewald, G. J., and Duncan, W. W.,
Coastal Engineering Santa Barbara
Specialty Conference, ASCE, Oct., 1965,
pp. 573-682. (TC203 .C9S6)

This is a progress report on the Homer Spit Beach Erosion Study. Information is presented regarding the rapid acceleration of the erosion processes due to the subsidence of Homer Spit during the 27 March 1964 earthquake. The effect on existing groins both before and after the quake are discussed. Immediately after the quake, emergency measures were required to prevent wave and high water damage to existing structures on the spit. An evaluation of the effectiveness of these measures is presented along with basic data gathered from the study and some of the problems encountered.

Key Words - Alaska/Timber/System/Accretion/Adjustable/Misc-plan/
Permeable/Impermeable/1965-1969/

"Maritime and Riparian Use of Gabions"
Anonymous, The Dock and Harbour Authority,
London, Vol. 46, No. 542, Dec., 1965, p.
254.

6512GR0001

Describing the various uses of gabions, this article includes a discussion on their usefulness in groin construction. Providing a semi-permeable structure, the use of gabions is especially advantageous where scour may occur on the downdrift side of the groin.

Key Words - Scour/Misc-materials/Structural-design/Misc-plan/High/
Low/1965-1969/Permeable/Geometric-shapes/

"Sea Groins Effectiveness Investigations
Dyed Sand Tests"
Kolp, O., Beiträge zur Meereskunde,
Deutsche Akademie der Wissenschaften zu
Berlin Institute für Meereskunde, Berlin,
Issue 17-18, 1966, pp. 6-90. (Translation)

6600GR0001

Presented is a method for investigation of groin effectiveness which represents progress toward a solution of a controversial problem. Experimental methods in the use of dyed sand are described. The results are presented as examples of changes in submarine relief, changes in current fields, and distribution of dyed sands. The results indicate the correctness of this approach to an investigation of this type.

Key Words - System/Europe/Erosion/Field/Piling/Accretion/Impermeable/

"Coastal Processes"

6606GR0001

Johnson, J. W., and Eagleson, P. S.,
Estuary and Coastline Hydrodynamics,
A. T. Ippen, ed., McGraw-Hill Book Co.,
Inc., New York, June, 1966, pp. 266-268.
(GC20 .I64e)

A general introduction is presented concerning classification and types of groins and their purposes.

Key Words - Permeable/Impermeable/High/Low/Timber/Steel/Concrete/
Adjustable/System/Single/

"Shore Protection, Planning and Design"

6606GR0002

U. S. Army Corps of Engineers, Coastal
Engineering Research Center Technical
Report, No. 4, 3rd ed., June, 1966.

The purpose of groins, their effects, types of groins, design criteria of the different types, and construction considerations are presented in this comprehensive text. Plans and photographic illustrations are included.

Key Words - Accretion/Artificial-fill/Erosion/Scour/Const-procedure/
Structural-design/Geometric-shapes/High/Long/Low/Short/
Adjustable/Great Lakes/Misc-plan/Notches/Single/System/
California/Asphalt/Concrete/Piling/Rubble-mound/Steel/
Timber/Impermeable/Permeable/Case/Du-Plat-Taylor/

"Beach Erosion Control Study, St. Johns
County, Florida"

6607GR0001

U. S. Army Corps of Engineers, House Document No. 97, 89th Congress, 2nd Session, July, 1966.

Key Words - House Document/Not Annotated/

"Special Study of City of San Diego
(Sunset Cliffs), California"

6608GR0001

U. S. Army Corps of Engineers, House Document No. 477, 89th Congress, 2nd Session, Aug., 1966.

Key Words - House Document/Not Annotated/

"Scouring Due to Wave Action at the Toe
of Permeable Coastal Structures"
Toru, S.; Proceedings of Tenth Conference
on Coastal Engineering, ASCE, Vol. 2,
Part 3, Sept., 1966, pp. 1036-1047.
(TC203 .C6)

6609GR0001

The author investigated scouring at the toe of permeable coastal structures on an experimental basis. He emphasized the influence on the scouring depth as affected by water depth at the toe, slope of seaward face and incident wave characteristics.

Key Words - Permeable/Experimental/Model/Scour/

"Shore Protection on the Coast of Yaizu"
Seo, G., and Fukuchi, T.; Proceedings of
Tenth Conference on Coastal Engineering,
ASCE, Vol. 2, Part 3, Sept., 1966, pp.
1183-1200. (TC203 .C6)

6609GR0002

A 15-element groin system was constructed as a measure of added protection against erosion at Yaizu, Japan. The paper deals mainly with the design of the breakwater structure, but photographs illustrate the groin system.

Key Words - Concrete/Impermeable/High/Short/System/Asia/

"Pinellas County, Florida"
U. S. Army Corps of Engineers, House Docu-
ment No. 519, 89th Congress, 2nd Session,
Oct., 1966.

6610GR0001

Key Words - House Document/Not Annotated/

"Mullet Key, Florida"
U. S. Army Corps of Engineers, House Docu-
ment No. 516, 89th Congress, 2nd Session,
Oct., 1966.

6610GR0002

Key Words - House Document/Not Annotated/

"Variations in Groin Design"

6705GR0001

Berg, D. W., and Watts, G. M., Journal of the Waterways and Harbors Division, ASCE, Vol. 93, No. WW2, Paper 5241, May, 1967, pp. 79-100.

See entry 6510GR0001.

Key Words - S. M. Wood/Adjustable/Budd/Permeable/Impermeable/System/
Low/Short/Concrete/Single/T-groins/Structural-design/
High/Long/Piling/Steel/Timber/Rubble-mound/Z-groins/
Misc-materials/Erosion/Notched/Asphalt/Field/Photographic/
N. Atlantic/Great Lakes/California/Hawaiian Islands/
S. Atlantic/Texas Gulf/Geometric-shapes/Alaska/

"Sea Defence Works - Groins and Revetments"
Manohar, M., Journal of the Institution of Engineers, London, Vol. 47, No. 9, Pt. C15, May, 1967, pp. 782-792.

6705GR0002

Key Words - Not Annotated/

"Shore Protection Experience in the United States"
Anonymous, News Letter, American Shore and Beach Preservation Assoc., July, 1967, 4 pp.

6707GR0001

A cursory review of coastal protection in the U. S. including the Great Lakes is presented.

Key Words - N. Atlantic/S. Atlantic/Texas Gulf/California/Great Lakes/
1900-1949/1950-1954/1955-1959/1960-1964/1965-1969/Field/

"Effect of Particle Size and Distribution on Stability of Artificially Filled Beach, Presque Isle Peninsula, Pennsylvania"
Berg, D. W., and Duane, D. B., Proceedings of Eleventh Conference on Great Lakes Research, International Assoc. for Great Lakes Research, Apr., 1968, pp. 161-178.
(Available as CERC Reprint 1-69)

6805GR0001

Coarse fill material was placed between two groins in an area within that zone on Presque Isle Peninsula which had experienced the

greatest amount of erosion. Isometric block diagrams are given in this comprehensive report which show cumulative volume changes within the groin embayment during the period from 1956 to 1968.

Key Words - Artificial-fill/Great Lakes/Erosion/Accretion/System/
1955-1959/1960-1964/1965-1969/

"Dade County, Florida"

6806GR0001

U. S. Army Corps of Engineers, House Document No. 335, 90th Congress, 2nd Session, June, 1968.

Key Words - House Document/Not Annotated/

"Brevard County, Florida"

6807GR0001

U. S. Army Corps of Engineers, House Document No. 352, 90th Congress, 2nd Session, July, 1968.

Key Words - House Document/Not Annotated/

"The Dynamics of a Coast with a Groyne System"

6809GR0001

Bakker, W. T., Proceedings of Eleventh Conference on Coastal Engineering, ASCE, Vol. 1, Sept., 1968, pp. 492-517.
(TC203 .C6)

A mathematical theory is presented about phenomena which occur when groins are constructed. In this theory the coast is schematized by two lines; one represents the beach, and the other the inshore. Theory is based upon the following: (1) littoral transport is a linear dependent of the angle of wave incidence, and (2) sand transport perpendicular to the coast depends on the steepness of the profile.

It was found that the influence of a groin system is threefold: (1) it reflects short-period beach processes on the adjacent areas, (2) retards erosion, and (3) gives lee-side scour.

Key Words - System/Impermeable/Erosion/Theory/Accretion/Single/Transport-normal/

"The Effect of Groynes on Stable Beaches"
Price, W. A., and Tomlinson, K. W., Proceedings of Eleventh Conference on Coastal Engineering, ASCE, Vol. 1, 1968, pp. 518-525. (TC203 .C6)

6809GR0002

Tests were carried out in a wave basin to study the effect of groins on a beach that was stable for a particular wave climate and a given supply of littoral material. The main result showed that on the part of the beach between H.W. and L.W. level the groins produced no buildup. The only buildup that occurred took place seaward of the impermeable groins. Permeable groins had little effect either inshore or offshore.

Key Words - Permeable/Impermeable/Accretion/Erosion/Experimental/
Model/High/Europe/Mobbs/

"Experimental Study of the Hydraulic Behavior of Groyne Systems"
Barcelo, J. P., Proceedings of Eleventh Conference on Coastal Engineering, ASCE, Vol. 1, Sept., 1968, pp. 526-548. (TC203 .C6)

6809GR0003

Results of an experimental study of the hydraulic behavior of groin systems are described. Characteristics of the evolution of beach stretches between groins under action of waves with different obliquity, heights and periods are defined. Results obtained are intended for design of systems of functional groins which secure an adequate partition of the beach in satisfactory hydraulic conditions, and also meeting use requirements, notably from the architectural and recreation standpoints. The author briefly discusses longshore transport, and presents some experimental conclusions on the relations between longshore drift and the characteristics of the waves.

Key Words - Experimental/Model/Theory/Short/Erosion/Accretion/Long/
System/Impermeable/

"The Creation of an Artificial Beach in Larvotto Bay -- Monte Carlo Principality of Monaco"
Tourmen, L., Proceedings of Eleventh Conference on Coastal Engineering, ASCE, Vol. 1, Sept., 1968, pp. 558-569. (TC203 .C6)

6809GR0004

Two short groins with breakwaters at their tips in a T-groin fashion were constructed in Larvotto Bay, Monte Carlo. The desired effect - to maintain a widened beach - was attained.

Key Words - Europe/System/Accretion/Concrete/Short/Impermeable/
Misc-plan/1965-1969/T-groins/

"The Terminal Problem in Coast Protection"
Pallett, N., Proceedings of Eleventh Conference on Coastal Engineering, ASCE, Vol. 1, Sept., 1968, pp. 549-557. (TC203 .C6)

6809GR0005

This paper introduces the terminal erosion problem which usually occurs downdrift of coast protection works, an important aspect of coast protection often overlooked. Value of groins in stabilizing the foreshore; use of artificial beach replenishment; and the effect on longshore regime following the construction of a seawall are discussed and illustrated.

Key Words - Terminal/Europe/Accretion/1960-1964/System/Erosion/
Artificial-fill/

"Cliff Drainage and Beach Distribution"
Fryde, W. T., Proceedings of Eleventh Conference on Coastal Engineering, ASCE, Vol. 1, Sept., 1968, pp. 644-652. (TC203 .C6)

6809GR0006

The main supply of material to the Clacton beaches was cut off following the construction of a seawall at the toe of the cliffs along the entire frontage. Supply from littoral drift was small and the only method of preserving the beaches was a good system of groins and the occasional placement of artificial fill.

Key Words - Europe/Concrete/Timber/1900-1949/Impermeable/Erosion/
Misc-plan/Structural-design/Accretion/System/
Artificial-fill/

"The Atlantic Coast of Long Island"
Panuzio, F. L., Proceedings of Eleventh Conference on Coastal Engineering, ASCE, Vol. 2, Sept., 1968, pp. 1222-1241. (TC203 .C6)

6809GR0007

This paper presents history, problems, construction and current results concerning critical condition of shore erosion, unstable inlets, and coastal inundation along the Long Island coast. Groin construction and resultant effects are discussed.

Key Words - N. Atlantic/Accretion/Erosion/System/High/Artificial-fill/Rubble-mound/Impermeable/1965-1969/

"Dubai Creek Entrance"

6809GR0008

Ridehalgh, H., Proceedings of Eleventh Conference on Coastal Engineering, ASCE, Vol. 2, Sept., 1968, pp. 1258-1266.
(TC203 .C6)

This paper describes works to improve and stabilize the Dubai Creek entrance located on the Arabian Gulf Coast. As part of the project a groin (jetty) was constructed to protect the entrance and to encourage accretion. Maps show accretion as the different phases of the project are completed.

Key Words - Asia/Steel/Piling/Accretion/Single/Impermeable/

"A Mathematical Theory about Sand Waves and Its Application on the Dutch Wadden Isle of Vlieland"

6810GR0001

Bakker, W. T., Shore and Beach, American Shore and Beach Preservation Assoc., Vol. 36, No. 2, Oct., 1968, pp. 5-14.

A mathematical theory for predicting sand wave formation was tested in the field, and showed that groins totally reflect the sand wave. The amplitude of the accretion and erosion at the spot of the first groin becomes twice the accretion and erosion where no groins had been constructed.

Key Words - Theory/Field/Impermeable/Erosion/Accretion/1966-1969/

"Report to the Twenty-second International Navigation Congress"

6900GR0001

Bijker, E. W., and Svasek, J. N., Twenty-second International Navigation Congress, Permanent International Association of Navigation Congresses, Sec. II, 1969, pp. 181-202. (TC5 .InBr)

This is an extensive research paper covering such aspects as theoretical and statistical analysis of longshore transport behavior of sediment movement, sediment balances, and determination of wave and current scale models. The influence of morphological mechanisms is outlined. Though groins are not explicitly discussed, structures are discussed which act similar to groins.

Key Words - Europe/Model/Experimental/Theory/

"Beach Erosion and Coastal Development
in the Canterbury Bight"
Kirk, R. M., New Zealand Geographer,
Christchurch, New Zealand, Vol. 25, 1969.

6900GR0002

Key Words - Not Annotated/

"Report to the Twenty-second International
Navigation Congress"
Féve, M., Twenty-second International
Navigation Congress, Permanent International
Association of Navigation Congresses,
Brussels, Belgium, Section 2 - Ocean Navigation,
Subject 4, 1969, pp. 63-109.
(TC5 .In8r)

6900GR0003

Key Words - Not Annotated/

"Report to the Twenty-second International
Navigation Congress"

6900GR0004

Abecasis, F., Castanho, J., Matias, M. F.,
Twenty-second International Navigation Congress
Permanent International Association of Navigation
Congresses, Brussels, Section 2 - Ocean Navigation,
Subject 4, 1969, pp. 203-242. (TC5 .IN8r)

A groin system was built along sand-spits to reinforce the spits and to check their end growth. Initially, artificial-fill was introduced into the system. The effects are presented in this paper.

Key Words - Africa/Europe/System/Artificial-fill/Erosion/
Accretion/1960-1964/1965-1969/Impermeable/

"Beach Erosion Control in New England"
Wentworth, C. E., Shore and Beach,
American Shore and Beach Preservation
Assoc., Vol. 37, No. 2, Oct., 1969,
pp. 24-30.

6910GR0001

An improvement plan consisting of groin construction and sand fill is outlined for Plum Island, Massachusetts.

Key Words - System/N. Atlantic/Artificial-fill/

"Colored-sand Tests with Luminescent Sand
Groin Fields"
Kolp, O., Petermanns Geographische Mitteilungen,
Vol. 114, 1970. Translated. (GB454 .B3 K29)

7000GR0001

The objectives of this investigation were: (1) the exploration of an approach that could be followed in later studies and which would be centered around the execution of colored-sand experiments; (2) to give a zonal breakdown of relief, flow field, sediment movement, and colored-sand distribution, and their modification by groins on various charts, and (3) to evaluate the effectiveness of various types of groins and to compare the hydrographic conditions existing in the shore areas of sections of coast with and without groins.

Key Words - 1960-1964/1965-1969/Erosion/Accretion/Europe/
Experimental/Scour/Piling/Impermeable/

"Coastal Defence Works"
Abecasis, F., Laboratório Nacional de
Engenharia Civil, Memoria No. 362, 1970,
pp. 36-40 (TC158 .P6 P853m)

7000GR0002

An extensive groin system built along a spit was designed not only to reinforce the spit, but also to stop its end growth. Initially, the inter-groin spaces were artificially filled.

Key Words - Africa/System/Impermeable/

"Model Studies in Situ Observations"
Castanho, J., Laboratorio Nacional de
Engenharia Civil, Memoria No. 362, 1970,
pp. 21-28. (TC158 .P6 P853m)

7000GR0003

Laboratory model studies followed extensive field investigations of coastal areas with erosion problems. After these studies were completed, effective measures, including groin construction, were applied.

Key Words - Europe/System/Model/Experimental/Impermeable/

"The History of the Dutch Coast in the Last Century"

7009GR0001

Bakker, W. T., and Joustra, D. Sj.,
Proceedings of the Twelfth Coastal Engineering Conference, ASCE, Vol. 2, Sept., 1970, pp. 709-728. (TC203 .C6)

An investigation of the influence of groins concluded that the erosion of areas with groins was much less than erosion of adjacent areas. This effect is due partly to lee-side scour, but mainly to decreased erosion in the protected area.

Key Words - Scour/Europe/Field/Rubble-mound/1800-1900/1900-1949/
1950-1954/1955-1959/1960-1964/Erosion/Accretion/
System/Impermeable/

"Some Sand Transport Phenomena on Coasts with Bars"

7009GR0002

Dyhr-Nielsen, M., and Sorensen, T.,
Proceedings of the Twelfth Coastal Engineering Conference, ASCE, Vol. 2, Sept., 1970, pp. 855-866. (TC203 .C6)

Effects of a single groin and a groin system located on the Danish west coast were investigated by field investigation and model tests.

Key Words - Europe/1900-1949/1950-1954/1955-1959/Single/System/
Impermeable/Model/Field/Experimental/Erosion/1965-1969/
Accretion/Structural-design/

"Experimental Study of the Hydraulic Behavior of Inclined Groyne Systems"
Barcelo, J. P., Proceedings of the Twelfth Coastal Engineering Conference, ASCE, Vol. 2, Sept., 1970, pp. 1021-1040. (TC203 .C6)

7009GR0003

This paper presents the results of an experimental study on the behavior of inclined groins and a short discussion on the improvement of groin systems. It supplements a paper presented at the Eleventh Coastal Engineering Conference (London, 1968). In the present paper both studies are applied to the design of a groin system located to the south of the Tagus estuary (near Lisbon), where serious erosion has taken place.

Key Words - Transport-normal/System/Misc-plan/Accretion/Erosion/
T-groins/Europe/Experimental/1900-1949/1955-1959/1960-
1964/1965-1969/Impermeable/

"Land Reclamation and Groin-Building in
the Tidal Flats"

7009GR0004

Erchinger, H. F., Proceedings of the Twelfth
Coastal Engineering Conference, ASCE, Vol. 2,
Sept., 1970, pp. 1041-1052. (TC203 .C6)

Development of new groin designs and groin construction on tidal flats on the North Sea coast of Germany are described. Of interest is the use of polyethylene in groin construction.

Key Words - Europe/Misc-materials/Timber/Concrete/Impermeable/
Structural-design/Rubble-mound/

"The Effect of Groynes on Eroded Beaches"

7009GR0005

Price, W. A., and Tomlinson, K. W.,
Proceedings of the Twelfth Coastal
Engineering Conference, ASCE, Vol. 2,
Sept., 1970, pp. 1053-1059. (TC203 .C6)

Effect of impermeable groins on an eroded beach was studied in a laboratory. A beach was allowed to reach equilibrium for a particular wave climate and supply of littoral material. The foreshore was then manually eroded, and the beach allowed to return to equilibrium with and without groins. It was found that the presence of groins increased the rate of accretion but did not significantly build up the inshore beach beyond the stable levels. Bed levels seaward of the groins were increased.

Key Words - Impermeable/Accretion/Erosion/Experimental/System/Europe/

"Characteristics of Shingle Beaches: the Solution to some Practical Problems"
Wood, A. M. M.; Proceedings of the Twelfth Coastal Engineering Conference, ASCE, Vol. 2, Sept., 1970, pp. 1059-1075. (TC203 .C6)

7009GR0006

Shingle beaches differ from sand beaches mainly in the mode of transport of the material and in the permeability of the beach. The typical beach forms are in consequence different and the typical problems of beach stabilization require different solutions.

The mechanism of littoral transport of shingle is controlled predominantly by the action of the breaking wave; on a groined beach a simple theory is advanced to relate transport to groin length and spacing.

Key Words - System/High/Theory/Field/Misc-plan/Long/Piling/
Steel/Concrete/Timber/Europe/

"Variation of Topography of Sea-Bed Caused by the Construction of Breakwaters"
Sato, S., and Irie, I., Proceedings of the Twelfth Coastal Engineering Conference, ASCE, Sept., 1970, pp. 1301-1319. (TC203 .C6)

7009GR0007

Changes of the topography of sea-bed caused by the construction of jetties and breakwaters are discussed on the basis of charts of several Japanese ports and the results of model tests.

Key Words - Asia/Field/Model/Experimental/

"The Dynamics of a Coast with a Groyne System"
Bakker, W. T., Breteler, E. H. J. K., Roos, A., Proceedings of the Twelfth Coastal Engineering Conference, ASCE, Vol. 2, Sept., 1970, pp. 1001-1020. (TC203 .C6)

7009GR0008

Mathematical coastal model is schematized by a beach line and an inshore line (two-line theory). Two aspects of the effects of a groin system are covered: (1) Prevention of littoral transport in area between shoreline and groin head, and (2) formation of a sheltered area at lee-side of groin, caused by diffraction.

Key Words - Theory/System/Model/Accretion/Erosion/Impermeable/

"Beach Behavior, North Shore, Long Island Sound"

7011GR0001

McCabe, R. A., Journal of Waterways, Harbors and Coastal Engineering Division, ASCE, Vol. 96, No. WW4, Paper No. 7679, Nov., 1970, pp. 781-794.

A groin system constructed and evaluated on White Sand Beach has shown: (1) necessary depth of the updrift flank of a groin depends on minimum sand cover on that side of the groin, and can be independent of the downdrift depth; (2) maximum width of the resulting stable beach is limited by capacity of a shorter groin at the end and the amount of sand available; (3) groin construction does not cause recession of an adjacent beach if that beach was already in its natural orientation, and (4) a groin is filled to capacity when it spills sand between the beach toe and the limit of normal wave uprush - in this study above about 2 feet higher than M.H.W.

Key Words - N. Atlantic/Rubble-mound/Structural-design/Misc-plan/
System/

"Experiment in Shore Protection"

7105GR0001

Riese, R. C., The Military Engineer, Society of American Military Engineers, Vol. 63, No. 413, May-June, 1971, pp. 181-182.

Lt. Colonel Riese from the Los Angeles District, U. S. Army Corps of Engineers, has outlined the Coastal Engineering Research Center's experimental groin project at Point Mugu, California. The project is designed to determine the influence, under different conditions of height, length, and permeability, the quantitative movement of sand over, around, and through a groin.

Key Words - Concrete/Long/High/Impermeable/Permeable/Adjustable/
Short/Low/Experimental/Field/Single/1970-1974/
California/

A U T H O R I N D E X

ABECASIS-C.K. REPORT TO THE 17TH INTERNATIONAL NAVIGATION CONGRESS	4900GR0001
ABECASIS-F. REPORT TO THE 22ND INTERNATIONAL NAVIGATION CONGRESS	6900GR0004
COASTAL DEFENCE WORKS	7000GR0002
ACENA-V.C. NA - REPORT TO THE 17TH INTERNATIONAL NAVIGATION CONGRESS	4900GR0002
ADVISORY BOARD ON REPORT OF ADVISORY BOARD ON BEACH PROTECTION LOS ANGELES COUNTY	3012GR0001
AGATZ-A. NA - SEA TRANSPORTATION STRUCTURES III-B	4900GR0008
ALLANSON-WINNAR-G. THE PROTECTION AND IMPROVEMENT OF FORESHORES BY THE UTILIZATION OF TIDAL AND WAVE ACTION	0306GR0001
ANONYMOUS THE PROTECTION AND PRESERVATION OF THE ATLANTIC SHORE FRONT OF THE STATE OF NEW YORK	6207GR0002
BASIC COASTAL MODEL	5800GR0004
MARITIME AND RIPARIAN USE OF GABIONS	6312GR0001
SHORE PROTECTION EXPERIENCE IN THE UNITED STATES	6707GR0001
RECEDING OF SHORELINE AT COCHIN BY GROYNES AND A SEAWALL	5900GR0004
NA - AN INVESTIGATION INTO THE EFFECTIVENESS OF VARIOUS TYPES OF GROYNES ON SEAFORD BEACH	6300GR0001
UNFINISHED BUSINESS NEW JERSEY GROIN PROJECT STALLED BY WINTER	5904GR0001
MAN AGAINST THE SEA A GUIDE TO EROSION CONTROL	0000GR0009
THE BUDD HORIZONTALLY PERMEABLE GROIN SYSTEM FOR BEACH EROSION CONTROL AND REBUILDING SAND BEACHES	0000GR0006
INTERIM REPORT ON ASPHALT GROINS AT OCEAN CITY MARYLAND	5607GR0001
HOW TO BUILD A BEACH AT ECONOMY PRICES	5509GR0001
CONCRETE SHORE PROTECTION	5500GR0001
PHOTOGRAPHS OF FORT MACON NEAR MOREHEAD CITY NORTH CAROLINA AFTER SERIES OF HURRICANES IN 1954	5400GR0001
EXPERIMENTAL GROINS CAMP PERRY OHIO	5309GR0001
DU-PLAT-TAYLOR ADJUSTABLE SCREW PILE GROYNES	3306GR0001
GALVESTON BEACH CONSTRUCTION	3604GR0003
JACOB RIIS PARK	3604GR0002
ROUND-TABLE DISCUSSION	3604GR0001
REPORT ON EROSION AT MANASQUAN INLET NEW JERSEY AND ADJACENT BEACHES	3801GR0002
REPORT ON BEACH EROSION AT HOLLYWOOD BEACH FLORIDA	3801GR0001
ROUND-TABLE DISCUSSION OF SHORE PROBLEMS IN RELATION TO RECREATION	3708GR0001
ASPHALT GROINS - TWO YEAR PLAN	5708GR0001
RECENT STORM DAMAGE ALONG THE COASTS OF FLORIDA AND MISSISSIPPI	4801GR0001
PERMEABLE JETTIES BUILT TO PROTECT CLEVELANDS SHORE	4507GR0001
REPORT ON ST. SIMON ISLAND STUDIES	4101GR0001
HANKS NEST BEACH CONNECTICUT	4001GR0003
INFORMATION ON BEACH PROTECTION IN FLORIDA	5210GR0008
NA - REPORT ON CONCRETE BLOCK GROINS	5205GR0001
SUMMARY REPORT ON STUDIES OF SAND TRANSPORTATION BY WAVE ACTION	5201GR0001
APTE-A.S. SOME COASTAL ENGINEERING PROBLEMS IN INDIA	5712GR0002
ASPHALT INSTITUTE	6204GR0001
ASPHALT GROINS	5511GR0002
ASPHALT GROINS AND JETTIES	5500GR0009
BAHR-M. NA - HELGOLAND HISTORY OF ITS ORIGIN AND MAINTENANCE OF ITS HARBOR RELATIVE TO NAVIGATION	7009GR0001
BAKER-W.F. THE HISTORY OF THE DUTCH COAST IN THE LAST CENTURY	6809GR0001
THE DYNAMICS OF A COAST WITH A GROYNES SYSTEM	7009GR0008
THE DYNAMICS OF A COAST WITH A GROYNES SYSTEM	6810GR0001
A MATHEMATICAL THEORY ABOUT SAND WAVES AND ITS APPLICATION ON THE DUTCH WADDEN ISLE OF VLIeland	0000GR0002
THE COASTAL DYNAMICS OF SAND WAVES AND THE INFLUENCE OF BREAKWATERS AND GROYNES	0000GR0001
ONE ASPECT OF THE DYNAMICS OF A COAST PARTLY PROTECTED BY A ROW OF GROYNES	0000GR0001

BARCELO,J.P.
EXPERIMENTAL STUDY OF THE HYDRAULIC BEHAVIOR OF INCLINED GROYNES SYSTEMS
EXPERIMENTAL STUDY OF THE HYDRAULIC BEHAVIOR OF GROYNES SYSTEMS
BASTE,M.
LES OUVRAGES DE DEFENCE CONTRE LA MER SUR LA COTE FRANCAISE DE LOCEAN ENTRE LA LOIRE ET LA GIRONDE
BEACH,L.M.
CERTAIN POINTS ABOUT EROSION COSTS AND MEASURES OF PROTECTION
BERG,D.W.
* VARIATIONS IN GROIN DESIGN
EFFECT OF PARTICLE SIZE AND DISTRIBUTION ON STABILITY OF ARTIFICIALLY FILLED BEACH PRESQUE ISLE PENINSULA
PENNSYLVANIA
VARIATIONS IN GROIN DESIGN
PERMEABLE GROINS FROM ILLINOIS ON LAKE MICHIGAN
GROINS FROM WISCONSIN ON LAKE MICHIGAN
PERMEABLE AND SEMIPERMEABLE GROINS FROM OHIO ON LAKE ERIE
BIJKER,E.W.
REPORT TO THE 22ND INTERNATIONAL NAVIGATION CONGRESS
BLAU,E.
NA - MODEL INVESTIGATIONS OF HARBOR INLET SILTING
NA - MODEL TESTS WITH MOVEABLE FLOOR IN SEA AND SEA HARBOR CONSTRUCTION
BLONDEAU,M.
LES OUVRAGES DE DEFENCE CONTRE LA MER SUR LA COTE FRANCAISE DE LOCEAN ENTRE LA LOIRE ET LA GIRONDE
BOASE,A.J.
SHORE PROTECTION BY PERMEABLE GROINS
BOWAS,P.
NA - UNDERWATER LONGITUDINAL WORKS FOR COASTAL PROTECTION
BOOTH,W.H.
LAKE MICHIGAN EROSION STUDIES
BRATER,E.F.
PROTECTING OUR SHORE LINE
LOW COST SHORE PROTECTION USED ON THE GREAT LAKES
BRAUN,W.
NA - CONSTRUCTION OF A HEAVY DUNE COVER BY ASPHALT-BASALT METHOD ON THE ISLAND OF BORKUM
BRETELIER,E.H.J.K.
THE DYNAMICS OF A COAST WITH A GROYNES SYSTEM
BROWN,E.I.
EROSION CONTROL AT WRIGHTSVILLE BEACH
BEACH EROSION STUDIES
BEACH EROSION STUDIES
BEACH EROSION STUDIES
BRUNS,E.
NA - SOME IDEAS ON THE PROBLEM OF RESEARCH IN COASTAL DYNAMICS AND MODEL TESTS OF COASTAL PROTECTION
BRUNN,P.
COASTAL ENGINEERING STUDY AT POMPANO BEACH
COASTAL PROTECTION PROCEDURES WITH SPECIAL REFERENCE TO CONDITIONS IN FLORIDA
COASTAL PROTECTION FOR FLORIDA
REVIEW OF BEACH EROSION AND STORM TIDE CONDITIONS IN FLORIDA 1961-1962
EMERGENCY MEASURES TO COMBAT BEACH EROSION
EMERGENCY METHODS TO COMBAT BEACH EROSION
IMPERMEABLE AND PERMEABLE GROINS
COASTAL PROTECTION REVIEW OF METHODS FOR DEFENCE
NA - MATERIAL HANDLING PA HARKYSTER
COAST EROSION AND THE DEVELOPMENT OF BEACH PROFILES
STABILITY OF BEACHES
COASTAL DEVELOPMENT AND COASTAL PROTECTION
FLORIDA COASTAL PROBLEMS
MEASURES AGAINST EROSION AT GROINS AND JETTIES

BRUNN,P. (CONTINUED)
SCATTERED GROINS
THE DANISH WESTCOAST - LITTORAL DRIFT PROBLEMS AND MEASURES AGAINST COAST EROSION
BUDD,W. PHOTOGRAPHS OF SARASOTA COUNTY FLORIDA SHOWING GROIN INSTALLATION
BULOW,K. NA - BIOLOGICAL HELP IN COASTAL PROTECTION
NA - ACTUAL PROBLEMS OF COASTAL PROTECTION
NA - GENERAL COASTAL DYNAMICS AND COASTAL PROTECTION OF THE SOUTH BALTIC SEA BETWEEN TRAVE AND SWINE
BURHORN,E. NA - SEAGROINS ON COASTS WITH WEAK TIDES AND STRONG SAND DRIFT
CASE,G.O. NA - CAUSES OF COAST EROSION AND ACCRETION
NA - COAST EROSION AND PROTECTION ON LONG ISLAND AND NEW JERSEY
COAST EROSION AND FORESHORE PROTECTION
CASTANHO,J. REPORT TO THE 22ND INTERNATIONAL NAVIGATION CONGRESS
MODEL STUDIES IN SITU OBSERVATIONS
COASTAL COMMISSION
NA - ALLGEMEINE EMPFEHLUNGEN FUR DEN DEUTSCHEN KUSTENSCHUTZ
NA - GUTACHTLICHE STELLUNGNAME ZU DEN UNTERSUCHUNGEN UBER DIE URSACHEN DER ABRUCHERSCHWUNGEN AM WEST UND N
ORD WESTSTRAND DER INSEL NORDERNEY
COEN-CAGLI,M.E. PROTECTION OF COASTS AGAINST THE SEA WITH OR WITHOUT PREPONDERATING COASTAL DRIFT OF MATERIALS
CORNING,L.H. CONCRETE SHORE PROTECTION STRUCTURES
COTTON,K.E. TIMBER IN THE CONSTRUCTION OF SEA DEFENCE AND RIVER WORKS
COULTAS,H.W. OBSERVATIONS ON THE TRAVEL OF SHORE MATERIAL ALONG A CHALK FORESHORE
DARRIGE,A. REPORT TO THE 15TH INTERNATIONAL NAVIGATION CONGRESS
DENT,E.J. SAND MOVEMENT AND BEACH EROSION
REPORT ON SHORE EROSION AT TILGHMAN POINT MARYLAND
DIAZ-MARTA,M. PROTECTION WORKS ON THE MEXICAN COAST THE CREATION OF BEACHES AND DUNES
DOBBIE,C.H. SOME SEA DEFENCE WORKS FOR RECLAIMED LANDS
REPORT TO THE 17TH INTERNATIONAL NAVIGATION CONGRESS
DREYFOUS-DUCAS,M. PROBLEMS DE DEFENSE DES COTES RESUSSITE DE ECHECS DE QUELQUES OUVRAGES
DUANE,D.B. EFFECT OF PARTICLE SIZE AND DISTRIBUTION ON STABILITY OF ARTIFICIALLY FILLED BEACH PRESQUE ISLE PENINSULA
PENNSYLVANIA
DUNCAN,W.W. STUDY OF EROSION ALONG HOMER SPIT AND VICINITY KACHEMAK BAY ALASKA
DUNHAM,J.W. USE OF LONG GROINS AS ARTIFICIAL HEADLANDS
DUVIVIER,J. THE SELSEY COAST PROTECTION SCHEME
REPORT TO THE 17TH INTERNATIONAL NAVIGATION CONGRESS
THE PROBLEM OF COAST EROSION
COAST PROTECTION SOME RECENT WORKS ON THE EAST COAST 1942-52
DU-PLAT-TAYLOR,F.M. THE PREVENTION OF COAST EROSION
THE PREVENTION OF COAST EROSION

DYHR-NIELSEN,M.	7009GR0002
SOME SAND TRANSPORT PHENOMENA ON COASTS WITH BARS	
EASTBURN,H.C.	6004GR0001
A CONTRACTOR BATTLES THE TIDES	
EATON,R.O.	5010GR0002
LITTORAL PROCESSES ON SANDY COASTS	
ERCHINGER,H.F.	7009GR0004
LAND RECLAMATION AND GROIN-BUILDING IN THE TIDAL FLATS	
ESSICK,M.G.	6500GR0003
PERMEABLE AND SEMIPERMEABLE GROINS FROM OHIO ON LAKE ERIE	
A PICTORIAL HISTORY OF SELECTED STRUCTURES ALONG THE NEW JERSEY COAST	
GROINS FROM WISCONSIN ON LAKE MICHIGAN	
PERMEABLE GROINS FROM ILLINOIS ON LAKE MICHIGAN	
EVANS,O.F.	6500GR0002
THE RELATION OF THE ACTION OF WAVES AND CURRENTS ON HEADLANDS TO THE CONTROL OF SHORE EROSION BY GROINS	
FARLEY,P.P.	4300GR0001
CONEY ISLAND PUBLIC BEACH AND BOARDWALK IMPROVEMENT	
FERGUSON,H.A.	2300GR0001
REPORT TO THE 18TH INTERNATIONAL NAVIGATION CONGRESS	
FEVE,M.	5300GR0003
NA - REPORT TO THE 22ND INTERNATIONAL NAVIGATION CONGRESS	
FINEREN,M.W.	6900GR0003
EARLY ATTEMPTS AT INLET CONSTRUCTION ON THE FLORIDA EAST COAST	
FISCHER,O.	3807GR0001
INFLUENCE OF PROTECTIVE WORKS ON THE EROSION OF THE WEST COAST OF SYLT NORTH SEA COAST OF GERMANY	
FURNEY,F.H.	0000GR0003
BEACH PROTECTION ENGINEERS ATTEMPT TO OUTWIT NATURE AT PRESQUE ISLE PENINSULA	
FRAUTSCHY,J.J.D.	5109GR0001
LITTORAL PROCESSES AND THE DEVELOPMENT OF SHORELINES	
FRECH,F.F.	6510GR0004
REPORT TO THE 17TH INTERNATIONAL NAVIGATION CONGRESS	
PAPER ON PROTECTIVE WORKS ADAPTED TO LIMIT EROSION ALONG THE OPEN COAST HOW THEY WORK	
FRIEDL,C.E.	4900GR0003
NEW COASTAL WORKS AT NAHARIYA (ISRAEL)	
FRYDE,M.T.	4806GR0001
CLIFF DRAINAGE AND BEACH DISTRIBUTION	
FUKUCHI,T.	6502GR0001
SHORE PROTECTION ON THE COAST OF YAIZU	
GERRITSEN,F.	6809GR0006
FLORIDA COASTAL PROBLEMS	
GOLF,C.V.	6609GR0002
SHORELINE ADVANCEMENT BY SEA WALL AND GROYNES AT COCHIN	
SOME COASTAL ENGINEERING PROBLEMS IN INDIA	
GOMES,N.	5712GR0002
NA - PROTECCAO DA COSTA CONTRA A EROSAO MARITIMA E FORMACAO DE PRAIAS DE ARCIA - DOIS PROBLEMAS NA COSTA DE MOCAMBIQUE	
GREEN,H.J.E.D.	6400GR0004
REPORT OF THE FORESHORE EROSION BOARD	
GRONWALD,G.G.J.	6410GR0002
STUDY OF EROSION ALONG HOMER SPIT AND VICINITY KACHEMAK BAY ALASKA	
GUTSCHE,H.	3612GR0001
NA - UBER DEN EINFLUSS VON STRANDBUHNEN AUF DIE SANDWANDERUNG AN FLACHKUSTEN	
HALE,R.K.	6511GR0001
SHORE PROTECTIVE WORK AT WINTHROP MASSACHUSETTS	
SHORE PROTECTIVE WORK AT WINTHROP MASSACHUSETTS	
	6100GR0001
	3806GR0001
	3807GR0003

HALL,J.V.	STRUCTURES FOR SHORE PROTECTION	6307GR0003
HALL,W.C.	COASTAL ENGINEERING STRUCTURES	6307GR0001
HALL,W.C.	BEACH PROTECTION MEASURES	4210GR0001
HANNON,J.T.	BEACH PROTECTION MEASURES	4206GR0001
HANSEN,W.	COASTAL PROTECTION IN MASSACHUSETTS	6010GR0002
NA -	PROVISIONS FOR STABILIZATION AND MAINTENANCE OF FLOATING ISLANDS OF THE SOUTH COAST OF GERMAN NORTH SEA	5700GR0004
NA -	MODEL TESTS OF BEACH BREAK AT THE END OF STABILIZED COASTAL BEACHES	0000GR0004
NA -	MODEL TESTS OF WAVE RUN-UP ON SEA DYKES IN WATT REGION	5400GR0004
HARDIN,J.R.	LAKE MICHIGAN EROSION STUDIES	5300GR0001
HARTLEY,R.P.	EFFECTS OF LARGE STRUCTURES ON THE OHIO SHORE OF LAKE ERIE	6400GR0002
HEISER,I.	REPORT TO THE 15TH INTERNATIONAL NAVIGATION CONGRESS	3100GR0002
HERBEST,T.R.,JR.	MESH JETTIES	3602GR0001
HIBBEN,B.	DIE SCHUTZBAUTEN AUF DER INSEL BORKUM	3512GR0001
HICKEY,R.E.	SHEET STEEL PILING FOR SHORE PROTECTION STRUCTURES	6210GR0001
HIRAVANDANI,M.G.	SHORELINE ADVANCEMENT BY SEA WALL AND GROYNES AT COCHIN	6008GR0003
HOLCOMBE,W.H.	PERMEABLE GROINS AT KENOSHA WISCONSIN	4001GR0001
HOMEIER,H.	EFFECTIVENESS OF PERMEABLE TYPE GROINS USED FOR BEACH PROTECTION AT SHOREWOOD WISCONSIN AND OTHER CITIES ALONG THE WEST SHORE OF LAKE MICHIGAN	3911GR0001
HON-WA,M.	NA - THE EFFECT OF ISLAND PROTECTIVE STRUCTURES ON BEACH DEVELOPMENT IN WEST PART OF NORDERNEY	5500GR0008
HON-WA,M.	NA - ON THE EFFECTS OF GROINS	5511GR0006
NA -	ON THE FLOW CHARACTERISTICS IN THE VICINITY OF GROINS	5511GR0004
NA -	COASTAL PROTECTION WORKS AND RELATED PROBLEMS IN JAPAN	6008GR0004
HOPKINS,W.C.	FUNCTIONS OF GROINS FUNDAMENTAL STUDY ON BEACH SEDIMENT AFFECTED BY GROINS (1)	5700GR0002
MARYLANDS	FAVORITE BEACH AT OCEAN CITY	5510GR0001
HORIKAWA,K.	NA - ON THE FLOW CHARACTERISTICS IN THE VICINITY OF GROINS	5511GR0004
NA -	ON THE EFFECTS OF GROINS	5511GR0006
NA -	FUNCTIONS OF GROINS FUNDAMENTAL STUDY ON BEACH SEDIMENT AFFECTED BY GROINS (1)	5700GR0002
NA -	AN EXPERIMENTAL STUDY ON THE EFFECT OF COASTAL GROINS	5810GR0001
NA -	COASTAL PROTECTION WORKS AND RELATED PROBLEMS IN JAPAN	6008GR0004
HORTON,D.F.	DESIGN AND CONSTRUCTION OF GROINS	5010GR0001
HOWARD,E.A.	NA - PERMEABLE GROINS OF CONCRETE CHECK BEACH EROSION	3500GR0001
HOYLE,J.W.	COAST PROTECTION - GROINE SYSTEMS	6204GR0004
NA -	A SCIENTIFIC BASIS FOR DESIGN OF GROINE SYSTEMS	6100GR0002
NA -	THE LONGITUDINAL STABILITY OF BEACHES	5511GR0003
NA -	THE ORIGIN AND STABILITY OF BEACHES	5712GR0003
NA -	GROYNES AS BARRIERS TO MOVEMENT OF BEACH MATERIAL	6200GR0003
NA -	COAST PROTECTION - GROYNES	6106GR0003

HUNDT,C.	5700GR0008
NA - DIE ABRUCHURSACHEN AN DER NORDWESTKUSTE DES ELLENBOGENS AUF SYLT	
HYDE,J.F.C.	3812GR0001
EFFECTIVENESS OF GROINS AT ROCKAWAY BEACH LONG ISLAND NEW YORK	
INMAN,D.L.	6510GR0004
LITTORAL PROCESSES AND THE DEVELOPMENT OF SHORELINES	
IRIE,I.	7009GR0007
VARIATION OF TOPOGRAPHY OF SEA-BED CAUSED BY THE CONSTRUCTION OF BREAKWATERS	
ISHIHARA,T.	6406GR0001
STABILITY OF BEACHES USING GROINS	
ISLA,A.G.	4900GR0002
NA - REPORT TO THE 17TH INTERNATIONAL NAVIGATION CONGRESS	
IWASA,N.	6112GR0002
BEACH EROSION AND PROTECTION WORKS IN IMAZU-SAKANO BEACH	
JACHOWSKI,R.A.	5905GR0001
BEHAVIOR OF SAND ASPHALT GROINS AT OCEAN CITY MARYLAND	
JANSEN,T.	5700GR0004
NA - PROVISIONS FOR STABILIZATION AND MAINTENANCE OF FLOATING ISLANDS OF THE SOUTH COAST OF GERMAN NORTH SEA	
	5600GR0003
NA - ISLAND PROTECTION ON EAST FRIESIAN COAST	
NA - GROINS WITH ASPHALT GROUT IN EAST FRIESIAN COAST REGION	5900GR0002
JOGLEKAR,D.V.	5712GR0002
SOME COASTAL ENGINEERING PROBLEMS IN INDIA	
JOHNSON,J.W.	6606GR0001
COASTAL PROCESSES	
THE ACTION OF GROINS ON BEACH STABILIZATION	4804GR0001
INFLUENCE OF GROINS ON BEACH STABILIZATION	5101GR0002
LITTORAL-DRIFT PROBLEM AT SHORE-LINE HARBORS	5900GR0003
JONES,J.H.	4806GR0002
WAVE ACTION ON BEACHES	
JOUSTRA,D.S.J.	7009GR0001
THE HISTORY OF THE DUTCH COAST IN THE LAST CENTURY	
KANNENBERT,E.G.	5800GR0002
NA - SCHUTZ UND ENTWASSERUNG DER NIEDERUNGSGEBIETE AN DER SCHLESWIG-HOLSTEINISCHEN OSTSEEKUSTE	
KEAT,T.B.	4110GR0001
COAST EROSION	4204GR0001
COAST EROSION IN GREAT BRITAIN	
KEMP,P.H.	6206GR0001
A MODEL STUDY OF THE BEHAVIOR OF BEACHES AND GROYNES	
KINGMAN,J.J.	4410GR0002
SHORE PROTECTION METHODS AND MATERIALS	
KING,G.T.	6106GR0003
NA - COAST PROTECTION - GROYNES	5712GR0003
THE ORIGIN AND STABILITY OF BEACHES	5511GR0003
THE LONGITUDINAL STABILITY OF BEACHES	6100GR0002
NA - A SCIENTIFIC BASIS FOR DESIGN OF GROYNES SYSTEMS	6200GR0003
NA - GROYNES AS BARRIERS TO MOVEMENT OF BEACH MATERIAL	6204GR0004
COAST PROTECTION - GROYNES SYSTEMS	
KINMONT,A.	6207GR0001
THE NEARSHORE MOVEMENT OF SAND AT DURBIN	
KIRK,R.M.	6900GR0002
NA - BEACH EROSION AND COASTAL DEVELOPMENT IN THE CANTERBURY BIGHT	
KLOSS	5200GR0007
NA - ASPHALT CONSTRUCTION IN GROIN BUILDING	
KOLP,O.	6600GR0001
SEA GROINS EFFECTIVENESS INVESTIGATIONS BY DYED SAND TESTS	
COLORSED SAND TESTS WITH LUMINESCENT SAND IN GROIN FIELDS	7000GR0001
NA - DIE NORDOSTLICHE HEIDE MECKLENBURGS	5700GR0003

KOLP.O.	(CONTINUED)	5600GR0002
KRAMER.J.	NA - WHAT HAPPENED TO PROTECTION OF OUR BALTIC SEA COAST	5500GR0008
	NA - THE EFFECT OF ISLAND PROTECTIVE STRUCTURES ON BEACH DEVELOPMENT IN WEST PART OF NORDERNEY	5700GR0014
	NA - ARTIFICIAL RESTORATION OF BEACHES WITH SPECIAL REGARD FOR BEACH FLUSHING NORDERNEY 1951-52	6008GR0005
	BEACH REHABILITATION BY USE OF BEACH FILLS AND FURTHER PLANS FOR THE PROTECTION OF THE ISLAND OF NORDERNEY	4500GR0001
KRESSNER.B.	NA - PROBLEMS OF ISLAND AND COAST PROTECTION	2806GR0001
	TEST WITH SCALE MODELS TO DETERMINE THE EFFECT OF CURRENTS AND BREAKERS UPON A SANDY BEACH AND THE ADVANTAGEOUS INSTALLATION OF GROINS	5812GR0001
KJBO.M.	MOTION OF SAND PARTICLES BETWEEN GROINS	6112GR0002
KJBO.M.	BEACH EROSION AND PROTECTION WORKS IN IMAZU-SAKANU BEACH	5510GR0002
KUGEL.F.O.	DIVISION OF SHORE EROSION - OHIO	5200GR0005
KURZAK.G.	NA - DIE URSACHEN DER ABRUCHERSCHERUNGEN AN WEST UND NORDWESTSTRAND DER INSEL NORDERNEY	5500GR0007
LAMPRECHT.H.	NA - SURGE AND SHORE CHANGES ON THE WEST COAST OF SYLT	5800GR0003
	NA - DUNE PROTECTIVE WORKS ON SYLT	5700GR0011
	NA - EFFECTS OF COASTAL PROTECTIVE STRUCTURES ON SYLT	5700GR0006
LATHROP.S.P.	NA - UFERVERÄNDERUNGEN UND KUSTENSCHUTZ AUF SYLT	4602GR0002
	PIERS AND JETTIES OF PRECAST CONCRETE	2902GR0001
LEEDS AND BARNARD	DETAIL OF CONCRETE BLOCK USED IN GROINS CONSTRUCTED AT MONTECITO CALIFORNIA	3610GR0001
LEEDS.C.T.	CALIFORNIA'S BEACH EROSION AND DEVELOPMENT PROBLEMS	5310GR0003
LEE.C.E.	FILLING PATTERN OF THE FORT SHERIDAN GROIN SYSTEM	5210GR0003
	CASE HISTORY OF SHORE PROTECTION AT PRESQUE ISLE PENINSULA PENNSYLVANIA	6105GR0001
LEOPOLD.E.	GROINS ON THE SHORE OF THE GREAT LAKES	5600GR0005
LILLIVANG.O.J.	NA - FLOOD PROTECTION AND COAST STABILIZATION	6510GR0003
	GROINS AND EFFECTS - MINIMIZING LIABILITIES	3605GR0001
LIPP.M.N.	SOME DATA ON BEACH PROTECTION WORKS	4910GR0002
	ALL STEEL GROINE - MIAMI BEACH	5500GR0003
LORENZEN.J.M.	NA - HUNDERT JAHRE KUSTENSCHUTZ AN DER NORDSEE	5200GR0004
LUDERS.K.	NA - DIE WIRKUNG DER BÜHNE H IN WANGEROOG WEST AUF DIE SEEGAT	5109GR0001
LYNDE.G.A.	BEACH PROTECTION ENGINEERS ATTEMPT TO OUTWIT NATURE AT PRESQUE ISLE PENINSULA	5803GR0001
	FEEDER BEACHES AND GROINS RESTORE PRESQUE ISLE PENINSULA	6010GR0002
MACKINNON.H.B.	COASTAL PROTECTION IN MASSACHUSETTS	5700GR0010
MAGEVS.C.	NA - BRANDUNGSUNTERSUCHUNGEN AN DEN KUSTEN VON FEMHARN UND NORDWAGRIEN	5700GR0009
	NA - KUSTENFORSCHUNGEN IM RAUM FEMHARN NORDWAGRIEN	5800GR0007
MANOHAR.M.	NA - SWELL AND SURGE AS BASIS FOR PLANNING AND DESIGN IN SEA STRUCTURES AND COASTAL PROTECTION	6705GR0002
	NA - SEA DEFENCE WORKS - GROINS AND REVETMENTS	6310GR0001
	COASTAL PROTECTION FOR FLORIDA	

MASON,M.A.	5310GR0002
PRINCIPLES OF SHORE PROTECTION FOR THE GREAT LAKES	
MATIAS,M.F.	6900GR0004
REPORT TO THE 22ND INTERNATIONAL NAVIGATION CONGRESS	
MATTHEWS,E.R.	3400GR0001
GROYNES	
MCCABE,R.A.	7011GR0001
BEACH BEHAVIOR NORTH SHORE LONG ISLAND SOUND	
MCINTOSH,R.J.	4410GR0001
STEEL SHEET PILING FOR SHORE AND BEACH PROTECTION STRUCTURES	
MILLIKEN,F.	4001GR0002
CURVED JETTIES SEA WALLS BULKHEADS AND RETAINING WALLS	
MINIKIN,R.R.	5409GR0001
FUNDAMENTALS OF COAST EROSION AND DEFENCE	
COAST EROSION	5000GR0003
WINDS WAVES AND MARITIME STRUCTURES	5000GR0001
COAST PROTECTION	4904GR0001
COAST EROSION AND PROTECTION - STUDIES IN CAUSES AND REMEDIES	5200GR0002
MURPHY,S.W.	2712GR0001
SEA DEFENCE EROSION AND PROTECTION ON A SANDY COAST	
MORGAN,M.H.	6211GR0001
REVIEW OF BEACH EROSION AND STORM TIDE CONDITIONS IN FLORIDA 1961-1962	
FLORIDA COASTAL PROBLEMS	5712GR0001
MYERS,H.B.	5604GR0001
BEACH EROSION CONTROL GRAND ISLE LOUISIANA	
NAGAI,S.	5609GR0001
ARRANGEMENT OF GROINS ON A SANDY BEACH	
MOTION OF SAND PARTICLES BETWEEN GROINS	5812GR0001
NA - ON THE ALIGNMENT OF COASTAL GROINS	5511GR0005
NA - ON THE COASTAL GROINS	5411GR0001
NICOL,F.E.	6010GR0001
DESIGN AND CONSTRUCTION OF THE SEAL BEACH GROIN	
OLIVER,A.C.	6101GR0001
NA - SEA DEFENCE GROYNES - 4	
NA - SEA DEFENCE GROYNES	5900GR0005
OLNSTEAD,A.W.	5803GR0001
FEEDER BEACHES AND GROINS RESTORE PRESQUE ISLE PENINSULA	
OTTOMAN	5300GR0005
NA - STEEP SHORE OF BRUOTEN - CAUSE OF BREAKING ...	
OWENS,J.S.	0800GR0001
COAST EROSION AND FORESHORE PROTECTION	
PALA,F.	3100GR0001
REPORT TO THE 15TH INTERNATIONAL NAVIGATION CONGRESS	
PALLETI,N.	6809GR0005
THE TERMINAL PROBLEM IN COAST PROTECTION	
PANCINI,G.	4900GR0006
NA - REPORT TO THE 17TH INTERNATIONAL NAVIGATION CONGRESS	
PANUZION,F.L.	6809GR0007
THE ATLANTIC COAST OF LONG ISLAND	
PEPER,G.	5500GR0006
NA - ORIGIN AND DEVELOPMENT OF ISLAND PROTECTIVE WORKS ON NORDERNEY	
PEROIXIS,H.S.	6102GR0001
BEHAVIOR OF BEACH FILLS IN NEW ENGLAND	
BEHAVIOR OF BEACH FILLS IN NEW ENGLAND	6200GR0002
PETERSEN,M.	5200GR0003
NA - ABRUCH UND SCHUTZ DER STEILUFER AN DER OSTSEEKUSTE	
REVIEW OF GERMAN EXPERIENCE ON COASTAL PROTECTION BY GROINS	6307GR0002

PETERS,A.G.	5600GR0008
NA - ASPHALT GROINS IN USA	4600GR0001
NA - REPORT ON THE USE OF ASPHALT AT GROIN CONSTRUCTION IN DELFTLAND (HOLLAND)	
PRESS,H.	5900GR0006
NA - CULTIVATED LAND CONSERVATION AND RECLAMATION	5800GR0006
NA - MANUAL OF WATER ECONOMY	
PRETIUS,E.S.	6107GR0001
A STUDY OF GROINS AND THEIR FUNCTION AS HYDRAULIC STRUCTURES	
PRICE,W.A.	7009GR0005
THE EFFECT OF GROYNES ON ERODED BEACHES	6809GR0002
THE EFFECT OF GROYNES ON STABLE BEACHES	
PURPURA,J.A.	6504GR0001
EMERGENCY METHODS TO COMBAT BEACH EROSION	6306GR0002
EMERGENCY MEASURES TO COMBAT BEACH EROSION	6211GR0001
REVIEW OF BEACH EROSION AND STORM TIDE CONDITIONS IN FLORIDA 1961-1962	
RANKIN,J.K.	5210GR0005
DEVELOPMENT OF THE NEW JERSEY SHORE	
RAYNER,A.C.	5210GR0002
LIFE OF STEEL SHEET PILE STRUCTURES IN ATLANTIC COASTAL STATES	5202GR0001
DURABILITY OF STEEL SHEET PILING IN SHORE STRUCTURES	6111GR0001
GROINS ON THE SHORES OF THE GREAT LAKES	
RECTOR,R.L.	6111GR0001
GROINS ON THE SHORES OF THE GREAT LAKES	
REED,T.M.	5903GR0001
BETTER JETTY FOR LESS MONEY	
REINALDAR.	6008GR0001
SCALE EFFECTS IN MODELS WITH LITTORAL SAND DRIFT	
REINEKE,H.	5500GR0004
NA - WHAT WATER ECONOMY EXPECTS FROM COASTAL RESEARCH	5600GR0004
NA - AUS DEN ARBEITEN DES KUSTENAUSSCHUSSES OST	
REINHARD,H.	5600GR0007
NA - COASTAL CHANGES AND COASTAL PROTECTION OF THE ISLAND HIDDENSEE	
RHODES,R.F.	3607GR0002
INVESTIGATIONS OF STEEL SHEET PILING	
RICHARDSON,H.	5900GR0005
NA - SEA DEFENCE GROYNES	
RIDEHALGH,H.	6809GR0008
DUBAI CREEK ENTRANCE	
RIEDER,K.	5800GR0005
NA - WATER ECONOMY BETWEEN NORTH SEA AND BALTIC SEA 1948-58	5700GR0007
NA - FOLGERUNGEN AUS UNTERSUCHUNGEN UBER KUSTENSCHUTZPROBLEME AUF SYLT	
RIESE,R.C.	7105GR0001
EXPERIMENT IN SHORE PROTECTION	
ROHNISH	5300GR0004
NA - HYDRAULIC STRUCTURES (GROINS DAMS DYKES AND CANAL EMBANKMENTS) OF BITUMEN TYPE	
ROOS,A.	7009GR0008
THE DYNAMICS OF A COAST WITH A GROYPE SYSTEM	
ROSS,C.W.	5202GR0001
DURABILITY OF STEEL SHEET PILING IN SHORE STRUCTURES	4910GR0001
DETERIORATION OF STEEL SHEET PILE GROINS AT PALM BEACH FLORIDA	4800GR0001
EXPERIMENTAL STEEL SHEET PILE GROINS PALM BEACH FLORIDA	
RUSSELL,R.C.H.	6000GR0001
COAST EROSION AND DEFENCE	
RYLANDS,A.	5607GR0002
CURVED GROINS AND FORESHORE DEFENCE	
SAKOU,T.	5700GR0002
FUNCTIONS OF GROINS FUNDAMENTAL STUDY ON BEACH SEDIMENT AFFECTED BY GROINS (1)	

SATO,S.	7009GR0007	0000GR0007	0000GR0007
VARIATION OF TOPOGRAPHY OF SEA-BED CAUSED BY THE CONSTRUCTION OF BREAKWATERS			
NA - ON THE LENGTH AND THE INTERNAL STRUCTURE OF SEASHORE GROINS			
SAVAGE,R.P.			
LABORATORY STUDY OF THE EFFECT OF GROINS ON THE RATE OF LITTORAL TRANSPORT EQUIPMENT DEVELOPMENT AND INITIAL ESTS			
SAWARAGI,T.	5906GR0001		
STABILITY OF BEACHES USING GROINS			
SCHJUF,J.B.	6406GR0001		
GENERALITIES ON COASTAL PROCESSES AND PROTECTION			
SCHMIDT,R.	5903GR0003		
REPORT TO THE 15TH INTERNATIONAL NAVIGATION CONGRESS			
SCHMITT,H.A.	3100GR0002		
SHOREWOOD PROTECTS ITS LAKE FRONT			
SCHMITZ,H.P.	3807GR0004		
NA - COASTAL PROTECTION AND SCIENTIFIC BASIS OF RESEARCH			
SCHOEMAKER,H.J.	5700GR0012		
REPORT TO THE 18TH INTERNATIONAL NAVIGATION CONGRESS			
SCOTT,T.A.	5300GR0003		
PLANNING SHORE PROTECTION			
SELLNER,E.P.	4910GR0003		
USE OF CONCRETE FOR SHORE PROTECTION			
SEO,G.	6204GR0002		
SHORE PROTECTION ON THE COAST OF YAIZU			
SHAY,E.A.	6609GR0002		
INFLUENCE OF GROINS ON BEACH STABILIZATION			
SHIMANO,T.	5101GR0002		
FUNCTIONS OF GROINS FUNDAMENTAL STUDY ON BEACH SEDIMENT AFFECTED BY GROINS (1)			
NA - ON THE EFFECTS OF GROINS			
NA - ON THE FLOW CHARACTERISTICS IN THE VICINITY OF GROINS			
SHIRGAN,L.	5700GR0002		
REPORT TO THE 21ST INTERNATIONAL NAVIGATION CONGRESS			
SIMKINS,T.D.	5511GR0006		
EROSION AND PALMETTO GROINS AT NORTH POINT ST.AUGUSTINE FLORIDA			
SMITH,D.	5511GR0004		
ASPHALT IN BEACH EROSION CONTROL STRUCTURES			
SONU,C.	6500GR0004		
AN EXPERIMENTAL STUDY ON THE EFFECT OF COASTAL GROINS			
SURENSEN,T.	3912GR0001		
THE DEVELOPMENT OF COAST PROFILES ON A RECEDING COAST PROTECTED BY GROYNES			
SOME SAND TRANSPORT PHENOMENA ON COASTS WITH BARS			
SPATARU,A.	6204GR0003		
CONSTRUCTION WORKS FOR THE PROTECTION OF THE COASTS			
STEINER,C.I.	5810GR0001		
CONSTRUCTION AND MAINTENANCE OF THE PUBLIC BEACH AT ROCKAWAY BEACH BOROUGH OF QUEENS			
SUHR,H.	6008GR0002		
NA - WATER ECONOMY BETWEEN NORTH SEA AND BALTIC SEA 1948-58			
NA - WATER ECONOMY BETWEEN NORTH AND BALTIC SEA KIEL			
SVASEK,J.N.	5100GR0001		
REPORT TO THE 22ND INTERNATIONAL NAVIGATION CONGRESS			
TAYLOR,L.B.	6900GR0001		
SEA WALLS AND GROINS OF STEEL SHEETING STABILIZE MIAMI BEACH			
TEUSCHL,E.	3105GR0001		
NA - REPORT TO THE 17TH INTERNATIONAL NAVIGATION CONGRESS			
THEIS,A.R.	4900GR0006		
BEACH EROSION CONTROL GRAND ISLE LOUISIANA			
	5604GR0001		

THIERRY,J.,M.
NA - REPORT TO THE 17TH INTERNATIONAL NAVIGATION CONGRESS
4900GR0007

THILO,R.
NA - DIE URSACHEN DER ABBRUCHSERSCHINUNGEN AN WEST UND NORDWESTSTRAND DER INSEL NORDERNEY
5200GR0005

THOMPSON,S.G.
PARTICIPATION OF FEDERAL RELIEF AGENCIES IN BEACH PROTECTION PROJECTS
3607GR0001

TOMLINSON,K.W.
THE EFFECT OF GROYNES ON STABLE BEACHES
6809GR0002
THE EFFECT OF GROYNES ON ERODED BEACHES
7009GR0005

TORU,S.
SCOURING DUE TO WAVE ACTION AT THE TOE OF PERMEABLE COASTAL STRUCTURES
6609GR0001

TOURNEMAL.
THE CREATION OF AN ARTIFICIAL BEACH IN LARVOTTO BAY MONTE CARLO PRINCIPALITY OF MONACO
6809GR0004

U S ARMY CORPS OF
NA - SHORE OF NEW JERSEY FROM SANDY HOOK TO BARNEGAT INLET BEACH EROSION CONTROL STUDY
5603GR0001
NA - MANITOWOC COUNTY FROM TWO RIVERS TO MANITOWOC WISCONSIN BEACH EROSION CONTROL STUDY
5602GR0002
NA - OCEANSIDE OCEAN BEACH IMPERIAL BEACH AND CORONADO SAN DIEGO COUNTY CALIFORNIA BEACH EROSION CONTROL STUDY
5605GR0001
NA - FIRE ISLAND INLET TO JONES INLET LONG ISLAND NEW YORK COOPERATIVE BEACH EROSION CONTROL STUDY
5605GR0002
NA - AREA 9 EAST RIVER TO NEW HAVEN HARBOR CONNECTICUT BEACH EROSION CONTROL STUDY
6206GR0003
NA - RARITAN BAY AND SANDY HOOK BAY NEW JERSEY
5606GR0001
NA - ATLANTIC COAST OF NEW YORK CITY FROM EAST ROCKAWAY INLET TO ROCKAWAY INLET AND JAMAICA BAY NEW YORK
5606GR0001
NA - ALAMEA BEACH AND HANAPEPE BAY ISLAND OF KAUAI T. H. BEACH EROSION CONTROL STUDY
6505GR0003
NA - CITY OF EVANSTON ILLINOIS BEACH EROSION CONTROL STUDY
6209GR0001
NA - SAN JUAN PUERTO RICO BEACH EROSION CONTROL STUDY
6106GR0001
NA - NEW JERSEY COAST OF DELAWARE BAY FROM CAPE MAY CANAL TO MAURICE RIVER BEACH EROSION CONTROL STUDY
6306GR0001
AERIAL PHOTOGRAPHS OF WALLIS SAND STATE BEACH RYE NEW HAMPSHIRE
5908GR0001
NA - SHORE OF NEW JERSEY - BARNEGAT INLET TO CAPE MAY CANAL BEACH EROSION CONTROL STUDY
6503GR0003
NA - WALKING BEACH OAHU HAWAII BEACH EROSION CONTROL STUDY
5712GR0004
NA - PALM BEACH COUNTY FROM LAKE WORTH INLET TO SOUTH LAKE WORTH INLET FLORIDA BEACH EROSION CONTROL STUDY
5504GR0006
NA - HAMLIN BEACH STATE PARK NEW YORK BEACH EROSION CONTROL STUDY
5509GR0002
NA - CITY OF KENOSHA WISCONSIN BEACH EROSION CONTROL STUDY
6407GR0003
AERIAL PHOTOGRAPHS PLUM ISLAND MASSACHUSETTS
6208GR0001
NA - SHORE OF THE STATE OF NEW HAMPSHIRE BEACH EROSION CONTROL STUDY
6205GR0003
NA - SHORE BETWEEN PEMBERTON POINT AND CAPE COD MASSACHUSETTS BEACH EROSION CONTROL STUDY
5910GR0001
NA - PERTH AMBOY NEW JERSEY BEACH EROSION CONTROL STUDY
6505GR0002
NA - CAROLINA BEACH AND VICINITY NORTH CAROLINA
6205GR0002
NA - MULLET KEY FLORIDA
6610GR0002
NA - FAIR HAVEN BEACH STATE PARK NEW YORK BEACH EROSION CONTROL STUDY
5504GR0005
NA - GRAND ISLE LOUISIANA BEACH EROSION CONTROL STUDY
5504GR0004
NA - BELLE PASS TO RACCOON POINT LOUISIANA BEACH EROSION CONTROL STUDY
6202GR0001
NA - SELKIRK SHORES STATE PARK NEW YORK BEACH EROSION CONTROL STUDY
5403GR0002
NA - ANAHEIM BAY HARBOR CALIFORNIA
5403GR0001
NA - HAMPTON BEACH NEW HAMPSHIRE BEACH EROSION CONTROL STUDY
5402GR0002
NA - APPENDIX XI OHIO SHORE LINE OF LAKE ERIE EUCLID TO CHAGRIN RIVER BEACH EROSION CONTROL STUDY
5402GR0001
NA - SAN DIEGO COUNTY CALIFORNIA APPENDIX IV PHASE 2 BEACH EROSION CONTROL STUDY
6009GR0001
NA - PINELLAS COUNTY FLORIDA BEACH EROSION CONTROL STUDY
5404GR0001
NA - COAST OF SOUTHERN CALIFORNIA - SPECIAL INTERIM REPORT ON THE VENTURA AREA COOPERATIVE BEACH EROSION CONTROL STUDY
6206GR0002
NA - SHORE OF NEW JERSEY FROM SANDY HOOK TO BARNEGAT INLET BEACH EROSION CONTROL STUDY
5602GR0002
NA - HALEIWA BEACH OAHU HAWAII BEACH EROSION CONTROL STUDY
6503GR0004
NA - AREA 7 - HOUSATONIC RIVER TO ASH CREEK CONNECTICUT BEACH EROSION CONTROL STUDY
5310GR0004
NA - WESTERLY RHODE ISLAND
6502GR0002
NA - APPENDIX II COAST OF CALIFORNIA POINT MUGU TO SAN PEDRO BREAKWATER BEACH EROSION CONTROL STUDY
5311GR0002
NA - VIRGINIA BEACH VIRGINIA BEACH EROSION CONTROL STUDY
5306GR0004
NA - GULF SHORE OF GALVESTON ISLAND TEXAS BEACH EROSION CONTROL STUDY
5307GR0002
NA - COLD SPRING INLET (CAPE MAY HARBOR) NEW JERSEY
5307GR0001

U S ARMY CORPS OF (CONTINUED)

NA - PRESQUE ISLE PENINSULA ERIE PENNSYLVANIA BEACH EROSION CONTROL STUDY C

NA - APPENDIX VIII OHIO SHORE LINE OF LAKE ERIE BETWEEN VERMILLION AND SHEFFIELD LAKE VILLAGE BEACH EROSION CONTROL STUDY

NA - PLUM ISLAND MASSACHUSETTS BEACH EROSION CONTROL STUDY

NA - WAIKIKI BEACH ISLAND OF OAHU T. H. BEACH EROSION CONTROL STUDY

PHOTOGRAPHS OF SASSO HILL BEACH FAIRFIELD CONNECTICUT AFTER GROIN CONSTRUCTION AND BEFORE FILL PLACEMENT

PHOTOGRAPHS OF COMPO BEACH WESTPORT CONNECTICUT AFTER GROIN CONSTRUCTION AND BEFORE FILL PLACEMENT

NA - AREAS 8 AND 11 SAUGATUCK RIVER TO BTHAM RIVER CONNECTICUT BEACH EROSION CONTROL STUDY

NA - BEACH EROSION AT JACOB RISS PARK LONG ISLAND NEW YORK

NA - SAN GABRIEL RIVER TO NEWPORT BAY ORANGE COUNTY CALIFORNIA APPENDIX V PHASE II BEACH EROSION CONTROL STUDY

NA - BEACH EROSION AT COMPO BEACH WESTPORT CONNECTICUT

NA - BEACH EROSION AT FOLLY BEACH SOUTH CAROLINA

NA - DUVAL COUNTY FLORIDA

NA - BEACH EROSION AT GALVESTON TEXAS

NA - WRIGHTSVILLE BEACH NORTH CAROLINA

NA - FORT FISHER NORTH CAROLINA

NA - CHATHAM MASSACHUSETTS BEACH EROSION CONTROL STUDY

NA - APPENDIX VI HUMBOLDT BAY (BUHNE POINT) CALIFORNIA BEACH EROSION CONTROL STUDY

NA - BEACH EROSION AT HOLLYWOOD BEACH FLORIDA

NA - BEACH EROSION AT MANASQUAN INLET NEW JERSEY AND ADJACENT BEACHES

NA - BEACH EROSION AT SANTA BARBARA CALIFORNIA

NA - BEACH EROSION AT WILLOUGHBY SPIT VIRGINIA

NA - DELAWARE COAST FROM KITTS HUMMOCK TO FENWICK ISLAND BEACH EROSION CONTROL STUDY

NA - SANTA CRUZ COUNTY CALIFORNIA BEACH EROSION CONTROL STUDY

NA - STUDY OF AN ARTIFICIAL BATHING BEACH AT ORCHARD BEACH PELHAM BAY NEW YORK

NA - PALM BEACH COUNTY FLORIDA FROM MARTIN COUNTY LINE TO LAKE WORTH INLET AND FROM SOUTH LAKE WORTH INLET TO BR OWARD COUNTY LINE BEACH EROSION CONTROL STUDY

NA - SOUTH KINGSTON AND WESTERLY RHODE ISLAND BEACH EROSION CONTROL STUDY

NA - PINELLAS COUNTY FLORIDA

NA - SHORE OF SHEFFIELD LAKE COMMUNITY PARK OHIO BEACH EROSION CONTROL STUDY

NA - VIRGINIA BEACH VIRGINIA COOPERATIVE BEACH EROSION CONTROL STUDY

NA - FORT MACON - ATLANTIC BEACH AND VICINITY NORTH CAROLINA

NA - CLARK POINT NEW BEDFORD MASSACHUSETTS BEACH EROSION CONTROL STUDY

NA - BEACH EROSION STUDY OF BAKERS HAULOVER INLET FLORIDA

NA - BEACH EROSION STUDY LAKE MICHIGAN SHORE LINE OF MILWAUKEE COUNTY WISCONSIN

NA - BEACH EROSION STUDY OHIO SHORE LINE OF LAKE ERIE FROM OHIO - MICHIGAN STATE LINE TO MARBLEHEAD OHIO

NA - ATLANTIC COAST OF LONG ISLAND FIRE ISLAND INLET AND SHORE WESTERLY TO JONES INLET NEW YORK

NA - BEACH EROSION STUDY LAKE ERIE SHORE LINE IN THE VICINITY OF HURON OHIO

NA - WESSAGUSSETT BEACH WYOMOUTH MASSACHUSETTS

NA - HUNTING ISLAND BEACH SOUTH CAROLINA

NA - BEACH EROSION STUDY ST. SIMON ISLAND GEORGIA

NA - SPECIAL STUDY OF CITY OF SAN DIEGO (SUNSET CLIFFS) CALIFORNIA

NA - BEACH EROSION STUDY ORANGE COUNTY CALIFORNIA

NA - LAKE ERIE SHORE LINE FROM THE MICHIGAN - OHIO STATE LINE TO MARBLEHEAD OHIO BEACH EROSION CONTROL STUDY

NA - NIAGARA COUNTY NEW YORK BEACH EROSION STUDY

NA - ATLANTIC CITY NEW JERSEY BEACH EROSION CONTROL STUDY

NA - BEACH EROSION STUDY CORONADO CALIFORNIA

NA - BREVARD COUNTY FLORIDA

NA - COLONIAL BEACH VIRGINIA BEACH EROSION CONTROL STUDY

NA - DADE COUNTY FLORIDA

NA - AREA 1 - ASH CREEK TO SAUGATUCK RIVER CONNECTICUT BEACH EROSION CONTROL STUDY

NA - OCRACOE ISLAND NORTH CAROLINA

NA - JUPITER ISLAND FLORIDA BEACH EROSION STUDY

NA - SANTA BARBARA CALIFORNIA BEACH EROSION CONTROL STUDY

NA - HARRISON COUNTY MISSISSIPPI BEACH EROSION CONTROL STUDY

NA - NORTH CAROLINA SHORE LINE BEACH EROSION STUDY

U S ARMY CORPS OF (CONTINUED)

NA - PALM BEACH FLORIDA BEACH EROSION STUDY
 NA - ANNA MARIA AND LONGBOAT KEYS FLORIDA BEACH EROSION STUDY
 NA - WINTHROP BEACH MASSACHUSETTS BEACH EROSION CONTROL STUDY
 NA - PUNTA LAS MARIAS SAN JUAN P. R. BEACH EROSION CONTROL STUDY
 SHORE PROTECTION PLANNING AND DESIGN
 NA - STATEN ISLAND FORT WADSWORTH TO ARTHUR KILL NEW YORK BEACH EROSION CONTROL STUDY
 NA - APPENDICES V AND X OHIO SHORE LINE OF LAKE ERIE BETWEEN ASHTABULA AND THE PENNSYLVANIA STATE LINE BEACH EROSION CONTROL STUDY
 NA - APPENDICES III VII AND XII OHIO SHORE LINE OF LAKE ERIE BETWEEN FAIRPORT AND ASHTABULA BEACH EROSION CONTROL STUDY
 NA - BEACH EROSION CONTROL STUDY ST JOHNS COUNTY FLORIDA
 NA - THAMES RIVER TO NANTIC BAY CONNECTICUT BEACH EROSION CONTROL STUDY
 NA - AMELIA ISLAND FLORIDA BEACH EROSION CONTROL STUDY
 NA - REVERE BEACH MASSACHUSETTS BEACH EROSION CONTROL STUDY
 NA - QUINCY SHORE BEACH MASSACHUSETTS BEACH EROSION CONTROL STUDY
 NA - REVERE BEACH MASSACHUSETTS BEACH EROSION CONTROL STUDY
 NA - BEACH EROSION CONTROL REPORT ON COOPERATIVE STUDY OF VIRGINIA AND BISCAYNE KEYS FLORIDA
 NA - PRESQUE ISLE PENINSULA ERIE PENNSYLVANIA BEACH EROSION CONTROL STUDY
 NA - APPENDIX IX - SHORE OF LAKE ERIE IN LAKE COUNTY OHIO BEACH EROSION CONTROL STUDY
 NA - CLEVELAND AND LAKEWOOD OHIO BEACH EROSION CONTROL STUDY
 NA - ATLANTIC CITY NEW JERSEY BEACH EROSION CONTROL STUDY
 NA - SOUTH SHORE STATE OF RHODE ISLAND BEACH EROSION CONTROL STUDY
 NA - AREA 2 - HAMMONSETT RIVER TO EAST RIVER CONNECTICUT BEACH EROSION CONTROL STUDY
 NA - AREA 4 - CONNECTICUT RIVER TO HAMMONSETT RIVER CONNECTICUT BEACH EROSION CONTROL STUDY
 NA - ILLINOIS SHORE OF LAKE MICHIGAN BEACH EROSION CONTROL STUDY
 NA - APPENDIX I COAST OF CALIFORNIA CARPENTERIA TO POINT MUGO BEACH EROSION CONTROL STUDY
 NA - APPENDIX IV OHIO SHORE LINE OF LAKE ERIE SANDUSKY TO VERMILLION OHIO BEACH EROSION CONTROL STUDY
 NA - AREA 5 PAMCATUCK RIVER TO THAMES RIVER CONNECTICUT BEACH EROSION CONTROL STUDY
 NA - BERRIEN COUNTY MICHIGAN BEACH EROSION CONTROL STUDY
 NA - APPENDIX XIV OHIO SHORE LINE OF LAKE ERIE SHEFFIELD LAKE VILLAGE TO ROCKY RIVER BEACH EROSION CONTROL STUDY
 NA - OCEAN CITY NEW JERSEY BEACH EROSION CONTROL STUDY
 NA - AREA 3 - NEW HAVEN HARBOR TO HOUSATONIC RIVER CONNECTICUT BEACH EROSION CONTROL STUDY
 NA - APPENDIX IV OHIO SHORE LINE OF LAKE ERIE SANDUSKY BAY OHIO BEACH EROSION CONTROL STUDY
 NA - AREA 6 - NANTIC BAY TO CONNECTICUT RIVER CONNECTICUT BEACH EROSION CONTROL STUDY
 NA - RACINE COUNTY WISCONSIN BEACH EROSION CONTROL STUDY
 VAN ASBECK, W. F.
 REPORT TO THE 18TH INTERNATIONAL NAVIGATION CONGRESS
 BITUMEN IN COASTAL ENGINEERING
 VAN DER BURGT, J. H.
 COAST PROTECTION ON THE NORTH SEA COASTS OF HOLLAND FRANCE BELGIUM AND GERMANY
 APPLICATION OF ASPHALT IN HYDRAULIC ENGINEERING WORKS
 NA - REPORT TO THE 17TH INTERNATIONAL NAVIGATION CONGRESS
 VERA, L. D.
 NA - REPORT TO THE 17TH INTERNATIONAL NAVIGATION CONGRESS
 VESPER, W. H.
 A PICTORIAL HISTORY OF SELECTED STRUCTURES ALONG THE NEW JERSEY COAST
 BEHAVIOR OF BEACH FILL AND BORROW AREA AT PROSPECT BEACH WEST HAVEN CONNECTICUT
 VISCONTINI, M.
 NA - REPORT TO THE 17TH INTERNATIONAL NAVIGATION CONGRESS
 VOLLBRECHT, K.
 NA - THEORETICAL OBSERVATIONS FOR INSTALLATION OF COASTAL PROTECTIVE STRUCTURES ON TIDELESS SHORES
 NA - BEACH ABRASION BY WAVES - REFLECTION ON STEEP WALL TYPE OF COASTAL PROTECTIVE STRUCTURES
 VOLLWERVE, E.
 A STUDY OF GROINS AND THEIR FUNCTION AS HYDRAULIC STRUCTURES

WASHINGTON,C.C.
GALVESTON ISLAND SHORELINE AND THE PROTECTION OF GALVESTON BEACH
PROTECTING GALVESTON BEACH
3807GR0002
3807GR0005

WATKINS,L.H.
SHORE EROSION AND CABBAGE PALMETTO GROINS AT NORTH POINT ST.AUGUSTINE FLORIDA
3811GR0001

WATTS,G.M.
VARIATIONS IN GROIN DESIGN
VARIATIONS IN GROIN DESIGN
BEHAVIOR OF BEACH FILL AT OCEAN CITY NEW JERSEY
5304GR0001
5204GR0002

WEBER,H.
PRECAST CONCRETE BLOCK GROINS
CONCRETE BLOCKS FORM LOW-COST GROINS
5100GR0001
5204GR0001

WEINLODT,E.
NA - WATER ECONOMY BETWEEN NORTH AND BALTIC SEA KIEL
6910GR0001

WELLS,J.D.
EROSION PROBLEMS ON THE ULTO SHORE OF LAKE ERIE
5210GR0004

WENTWORTH,C.E.
BEACH EROSION CONTROL IN NEW ENGLAND
5810GR0002

WEY,G.L.
SOME ASPECTS OF SHORE PROTECTION IN BOSTON HARBOR
6400GR0003

WICKER,C.F.
SUMMARY STATEMENT CONCERNING IMPORTANCE OF A GROIN DESIGN CRITERION
5504GR0001

WIEGEL,R.L.
OCEANOGRAPHICAL ENGINEERING
2806GR0002

WILLIAMS,R.K.
THE ASPHALT GROINS AT OCEAN CITY MARYLAND
5000GR0002

WINKEL,R.
NA - DIE BUHNENWIRKUNG
5504GR0002

WOHLBERG,E.
NA - ORIGIN AND DECLINE OF THE ISLAND TRISCHEN
7009GR0006

WOODSON,D.D.
THE FERNANDINA BEACH GROINS
0000GR0008

WOOD,A.W.,M.
CHARACTERISTICS OF SHINGLE BEACHES: THE SOLUTION TO SOME PRACTICAL PROBLEMS
3011GR0001

WOOD,S.W.
THE PRINCIPLE OF INCREASING PERMEABILITY IN GROIN CONSTRUCTION
3309GR0001

THE NORTH SHORE VERSUS LAKE MICHIGAN
ART OF FORMING PROTECTIVE BEACHES
3505GR0002

JETTY
JETTY
3505GR0001

A NEW METHOD OF CONSTRUCTION IN COAST EROSION CONTROL
NA - PATENT NO 19786
3512GR0002

JETTY
EROSION OF OUR COASTAL FRONTIERS
EROSION OF OUR COASTAL FRONTIERS - PART II
3711GR0001

ART OF BEACH PROTECTION
MOSENIITZ,W.-B.
THE MOSENIITZ PRECAST PERMEABLE GROIN
3804GR0001

ZHDANOVA,N.
STABILIZATION OF SHINGLE ALLUVIAL SHORES BY GROINS OF FULL PROFILE
4405GR0001

ZISCHER,F.
NA - POSSIBILITIES AND LIMITS FOR APPLICATION OF ASPHALT TYPES OF CONSTRUCTIONS FOR COASTAL PROTECTION
4510GR0001

NA - PROTECTION OF THE WEST BEACH OF SYLT ISLAND BY FLAT GROINS
0000GR0005

ZSCHIESCHE,O.
SUITABILITY OF MODEL TESTS IN MARITIME ENGINEERING IN HARBORS SEAWAYS AND COASTAL PROTECTION
6400GR0001

NA - SUITABILITY OF MODEL TESTS IN MARITIME ENGINEERING IN HARBORS SEAWAYS AND COASTAL PROTECTION
5700GR0013
6000GR0002

602SR11BC 0710071009 GEN GROIN BIBLIOGRAPHY
5600GR0006

T I T L E I N D E X

ACCRETION	(CONTINUED)	6000GR0001
COAST EROSION AND DEFENCE		5602GR0001
BEHAVIOR OF BEACH FILL AT OCEAN CITY NEW JERSEY		5510GR0001
MARYLAND'S FAVORITE BEACH AT OCEAN CITY		5903GR0002
COASTAL ENGINEERING STUDY AT POMPANO BEACH		5509GR0001
HOW TO BUILD A BEACH AT ECONOMY PRICES		5604GR0001
BEACH EROSION CONTROL GRAND ISLE LOUISIANA		5504GR0003
STABILITY OF BEACHES		6108GR0001
BEHAVIOR OF BEACH FILL AND BORROW AREA AT PROSPECT BEACH WEST HAVEN CONNECTICUT		6008GR0001
SCALE EFFECTS IN MODELS WITH LITTORAL SAND DRIFT		5409GR0001
FUNDAMENTALS OF COAST EROSION AND DEFENCE		4910GR0003
PLANNING SHORE PROTECTION		4900GR0003
REPORT TO THE 17TH INTERNATIONAL NAVIGATION CONGRESS		4804GR0001
THE ACTION OF GROINS ON BEACH STABILIZATION		5311GR0001
COASTAL PROTECTION REVIEW OF METHODS FOR DEFENCE		5200GR0002
COAST EROSION AND PROTECTION - STUDIES IN CAUSES AND REMEDIES		5109GR0001
BEACH PROTECTION ENGINEERS ATTEMPT TO OUTWIT NATURE AT PRESQUE ISLE PENINSULA		4900GR0001
REPORT TO THE 17TH INTERNATIONAL NAVIGATION CONGRESS		5210GR0003
CASE HISTORY OF SHORE PROTECTION AT PRESQUE ISLE PENINSULA PENNSYLVANIA		5310GR0003
FILLING PATTERN OF THE FORT SHERIDAN GROIN SYSTEM		5000GR0001
WINDS WAVES AND MARITIME STRUCTURES		4700GR0001
THE PROBLEM OF COAST EROSION		5201GR0001
SUMMARY REPORT ON STUDIES OF SAND TRANSPORTATION BY WAVE ACTION		4806GR0001
PAPER ON PROTECTIVE WORKS ADAPTED TO LIMIT EROSION ALONG THE OPEN COAST HOW THEY WORK		4904GR0001
COAST PROTECTION		5310GR0001
LOW COST SHORE PROTECTION USED ON THE GREAT LAKES		5306GR0001
COAST PROTECTION SOME RECENT WORKS ON THE EAST COAST 1942-52		4806GR0002
WAVE ACTION ON BEACHES		5210GR0003
CASE HISTORY OF SHORE PROTECTION AT PRESQUE ISLE PENINSULA PENNSYLVANIA		5300GR0001
LAKE MICHIGAN EROSION STUDIES		5008GR0001
THE DANISH WESTCOAST - LITTORAL DRIFT PROBLEMS AND MEASURES AGAINST COAST EROSION		5010GR0002
LITTORAL PROCESSES ON SANDY COASTS		5101GR0002
INFLUENCE OF GROINS ON BEACH STABILIZATION		5006GR0003
COAST EROSION		4602GR0002
PIERS AND JETTIES OF PRECAST CONCRETE		3811GR0001
SHORE EROSION AND CARBAGE PALMETTO GROINS AT NORTH POINT ST.AUGUSTINE FLORIDA		3807GR0001
EARLY ATTEMPTS AT INLET CONSTRUCTION ON THE FLORIDA EAST COAST		3806GR0001
SHORE PROTECTIVE WORK AT WINTHROP MASSACHUSETTS		3804GR0001
EROSION OF OUR COASTAL FRONTIERS		4001GR0003
HAWKS NEST BEACH CONNECTICUT		3710GR0001
ROUND-TABLE DISCUSSION OF SHORE PROBLEMS IN RELATION TO RECREATION		4006GR0001
REPORT ON SHORE EROSION-AT TILGHMAN POINT MARYLAND		3711GR0001
JETTY		3812GR0001
EFFECTIVENESS OF GROINS AT ROCKAWAY BEACH LONG ISLAND NEW YORK		3812GR0001
CURVED JETTIES SEA WALLS BULKHEADS AND RETAINING WALLS		4001GR0002
THE RELATION OF THE ACTION OF WAVES AND CURRENTS ON HEADLANDS TO THE CONTROL OF SHORE EROSION BY GROINS		4300GR0001
REPORT OF THE FORESHORE EROSION BOARD		3612GR0001
PERMEABLE GROINS AT KAKOSHIA *ISCONSIN		4001GR0001
REPORT ON EROSION AT MANASQUAN INLET NEW JERSEY AND ADJACENT BEACHES		3801GR0002
SHORE PROTECTIVE WORK AT WINTHROP MASSACHUSETTS		3807GR0003
CALIFORNIA'S BEACH EROSION AND DEVELOPMENT PROBLEMS		3610GR0001
CONCRETE SHORE PROTECTION STRUCTURES		4410GR0003
CONSTRUCTION AND MAINTENANCE OF THE PUBLIC BEACH AT ROCKAWAY BEACH BOROUGH OF QUEENS		3610GR0002
BEACH EROSION STUDIES		3901GR0001
DIE SCHUTZBAUTEN AUF DEM INSEL BORKUM		3512GR0001
INFLUENCE OF PROTECTIVE WORKS ON THE EROSION OF THE WEST COAST OF SYLT NORTH SEA COAST OF GERMANY		0000GR0003
THE COASTAL DYNAMICS OF SAND WAVES AND THE INFLUENCE OF BREAKWATERS AND GROYNES		0000GR0002

ACCRETION	ONE ASPECT OF THE DYNAMICS OF A COAST PARTLY PROTECTED BY A ROW OF GROYNES A NEW METHOD OF CONSTRUCTION IN COAST EROSION CONTROL JETTY	0000GR0001 3507GR0001 3505GR0001 3309GR0001 0800GR0001 0306GR0001 0000GR0001 0000GR0000 0000GR0005 3202GR0001 3100GR0002 3100GR0001 3012GR0001 3011GR0001 2806GR0001
ADJUSTABLE	ART OF FORMING PROTECTIVE BEACHES COAST EROSION AND FRESHWATER PROTECTION THE PROTECTION AND IMPROVEMENT OF FRESHWATER BY THE UTILIZATION OF TIDAL AND WAVE ACTION MAN AGAINST THE SEA A GUIDE TO EROSION CONTROL THE BUDD HORIZONTALLY PERMEABLE GROIN SYSTEM FOR BEACH EROSION CONTROL AND REBUILDING SAND BEACHES THE MOSENIITZ PERMEABLE GROIN PROTECTION OF COASTS AGAINST THE SEA WITH OR WITHOUT PREPONDERATING COASTAL DRIFT OF MATERIALS REPORT TO THE 15TH INTERNATIONAL NAVIGATION CONGRESS REPORT TO THE 15TH INTERNATIONAL NAVIGATION CONGRESS REPORT OF ADVISORY BOARD ON BEACH PROTECTION LOS ANGELES COUNTY THE NORTH SHORE VERSUS LAKE MICHIGAN TEST WITH SCALE MODELS TO DETERMINE THE EFFECT OF CURRENTS AND BREAKERS UPON A SANDY BEACH AND THE ADVANTAGEOUS INSTALLATION OF GROINS	7105GR0001 6211GR0001 6400GR0003 6705GR0001 6510GR0001 6511GR0001 6310GR0001 6606GR0002 6306GR0002 6606GR0001 6500GR0002 6412GR0001 6504GR0001 5504GR0003 5409GR0004 5810GR0001 5903GR0002 5700GR0001 5712GR0001 4700GR0001 4900GR0004 4110GR0001 4000GR0003 4104GR0001 4204GR0001 3306GR0001 3602GR0001 6900GR0004 7000GR0002 6207GR0001 6511GR0001 6705GR0001 6510GR0001 6809GR0006 6900GR0004 6910GR0001
AFRICA	REPORT TO THE 22ND INTERNATIONAL NAVIGATION CONGRESS COASTAL DEFENCE WORKS THE NEARSHORE MOVEMENT OF SAND AT DURBAN	
ALASKA	STUDY OF EROSION ALONG HOMER SPIT AND VICINITY KACHEMAK BAY ALASKA VARIATIONS IN GROIN DESIGN VARIATIONS IN GROIN DESIGN	
ARTIFICIAL-FILL	CLIFF DRAINAGE AND BEACH DISTRIBUTION REPORT TO THE 22ND INTERNATIONAL NAVIGATION CONGRESS BEACH EROSION CONTROL IN NEW ENGLAND	

ARTIFICIAL-FILL	6211GR0001
THE ATLANTIC COAST (CONTINUED)	6809GR0007
THE TERMINAL PROBLEM IN COAST PROTECTION	6809GR0005
EMERGENCY MEASURES TO COMBAT BEACH EROSION	6306GR0002
EMERGENCY METHODS TO COMBAT BEACH EROSION	6504GR0001
REVIEW OF BEACH EROSION AND STORM TIDE CONDITIONS IN FLORIDA 1961-1962	6211GR0001
EFFECT OF PARTICLE SIZE AND DISTRIBUTION ON STABILITY OF ARTIFICIALLY FILLED BEACH PRESQUE ISLE PENINSULA	6805GR0001
PENNSYLVANIA	6200GR0002
BEHAVIOR OF BEACH FILLS IN NEW ENGLAND	6400GR0003
OCEANOGRAPHICAL ENGINEERING	6310GR0001
COASTAL PROTECTION FOR FLORIDA	6307GR0003
STRUCTURES FOR SHORE PROTECTION	5712GR0001
FLORIDA COASTAL PROBLEMS	6010GR0001
DESIGN AND CONSTRUCTION OF THE SEAL BEACH GROIN	6004GR0001
A CONTRACTOR BATTLES THE TIDES	5812GR0001
PROTECTING OUR SHORE LINE	6008GR0005
BEACH REHABILITATION BY USE OF BEACH FILLS AND FURTHER PLANS FOR THE PROTECTION OF THE ISLAND OF NORDERNEY	6111GR0001
GROINS ON THE SHORES OF THE GREAT LAKES	6000GR0001
COAST EROSION AND DEFENCE	5504GR0003
STABILITY OF BEACHES	5604GR0001
BEACH EROSION CONTROL GRAND ISLE LOUISIANA	5903GR0003
GENERALITIES ON COASTAL PROCESSES AND PROTECTION	6102GR0001
BEHAVIOR OF BEACH FILLS IN NEW ENGLAND	5803GR0001
FEEDER BEACHES AND GROINS RESTORE PRESQUE ISLE PENINSULA	5300GR0001
LAKE MICHIGAN EROSION STUDIES	5204GR0001
EROSION PROBLEMS ON THE OHIO SHORE OF LAKE ERIE	3901GR0001
EROSION STUDIES	3807GR0005
PROTECTING GALVESTON BEACH	4101GR0001
REPORT ON ST. SIMON ISLAND STUDIES	4016GR0001
EROSION CONTROL AT WRIGHTSVILLE BEACH	4206GR0001
BEACH PROTECTION MEASURES	4000GR0002
BEACH EROSION STUDIES	4001GR0003
HAWKS NEST BEACH CONNECTICUT	2300GR0001
CONEY ISLAND PUBLIC BEACH AND BOARDWALK IMPROVEMENT	6809GR0008
ASIA	7009GR0007
DUBAI CREEK ENTRANCE	6500GR0004
VARIATION OF TOPOGRAPHY OF SEA-BED CAUSED BY THE CONSTRUCTION OF BREAKWATERS	6509GR0002
REPORT TO THE 21ST INTERNATIONAL NAVIGATION CONGRESS	6406GR0001
SHORE PROTECTION ON THE COAST OF YALIZU	6502GR0001
STABILITY OF BEACHES USING GROINS	6400GR0001
NEW COASTAL WORKS AT NAHARIYA (ISRAEL)	6112GR0002
STABILIZATION OF SINGLE ALLUVIAL SHORES BY GROINS OF FULL PROFILE	5900GR0004
BEACH EROSION AND PROTECTION WORKS IN IMAZU-SAKANO BEACH	6008GR0004
RECEDING OF SHORELINE AT COCHIN BY GROynes AND A SEAWALL	5712GR0002
COASTAL PROTECTION WORKS AND RELATED PROBLEMS IN JAPAN	4410GR0001
SOME COASTAL ENGINEERING PROBLEMS IN INDIA	6204GR0003
STEEL SHEET PILING FOR SHORE AND BEACH PROTECTION STRUCTURES	6705GR0001
ASPHALT	6400GR0003
ASPHALT IN BEACH EROSION CONTROL STRUCTURES	6510GR0001
VARIATIONS IN GROIN DESIGN	6307GR0002
OCEANOGRAPHICAL ENGINEERING	6606GR0002
VARIATIONS IN GROIN DESIGN	6204GR0001
REVIEW OF GERMAN EXPERIENCE ON COASTAL PROTECTION BY GROINS	6310GR0001
SHORE PROTECTION PLANNING AND DESIGN	6310GR0001
ASPHALT GROINS	5905GR0001
COASTAL PROTECTION FOR FLORIDA	
BEHAVIOR OF SAND ASPHALT GROINS AT OCEAN CITY MARYLAND	

ASPHALT	5509GR0001
HOW TO BUILD A BEACH AT ECONOMY PRICES	5504GR0001
THE ASPHALT GROINS AT OCEAN CITY, MARYLAND	5409GR0002
BITUMEN IN COASTAL ENGINEERING	5903GR0001
BETTER JETTY FOR LESS MONEY	5904GR0001
UNFINISHED BUSINESS NEW JERSEY GROIN PROJECT STALLED BY WINTER	5511GR0002
ASPHALT GROINS AND JETTIES	5708GR0001
ASPHALT GROINS - TWO YEAR PLAN	5504GR0002
THE FERNANDINA BEACH GROINS	5510GR0001
MARYLANDS FAVORITE BEACH AT OCEAN CITY	5101GR0001
APPLICATION OF ASPHALT IN HYDRAULIC ENGINEERING WORKS	5300GR0003
REPORT TO THE 18TH INTERNATIONAL NAVIGATION CONGRESS	
AUSTRALIA	
REPORT OF THE FORESHORE EROSION BOARD	3612GR0001
BUDD	
VARIATIONS IN GROIN DESIGN	6705GR0001
VARIATIONS IN GROIN DESIGN	6510GR0001
REVIEW OF BEACH EROSION AND STORM TIDE CONDITIONS IN FLORIDA 1961-1962	6211GR0001
PHOTOGRAPHS OF SARASOTA COUNTY, FLORIDA SHOWING GROIN INSTALLATION	6200GR0001
THE BUDD HORIZONTALLY PERMEABLE GROIN SYSTEM FOR BEACH EROSION CONTROL AND REBUILDING SAND BEACHES	0000GR0005
CALIFORNIA	
EXPERIMENT IN SHORE PROTECTION	7105GR0001
GROINS AND EFFECTS - MINIMIZING LIABILITIES	6510GR0003
VARIATIONS IN GROIN DESIGN	6510GR0001
SHORE PROTECTION EXPERIENCE IN THE UNITED STATES	6707GR0001
VARIATIONS IN GROIN DESIGN	6705GR0001
LITTORAL PROCESSES AND THE DEVELOPMENT OF SHORELINES	6510GR0004
USE OF LONG GROINS AS ARTIFICIAL HEADLANDS	6510GR0002
DESIGN AND CONSTRUCTION OF THE SEAL BEACH GROIN	6010GR0001
LITTORAL-DRIFT PROBLEM AT SHORE-LINE HARBORS	5900GR0003
SCATTERED GROINS	5009GR0001
CALIFORNIA'S BEACH EROSION AND DEVELOPMENT PROBLEMS	3610GR0001
BEACH EROSION STUDIES	4000GR0001
SHORE PROTECTION METHODS AND MATERIALS	4410GR0002
STEEL SHEET PILING FOR SHORE AND BEACH PROTECTION STRUCTURES	4210GR0001
BEACH PROTECTION MEASURES	4210GR0001
BEACH PROTECTION MEASURES	4206GR0001
DETAIL OF CONCRETE BLOCK USED IN GROINS CONSTRUCTED AT MONTECITO, CALIFORNIA	2902GR0001
CASE	
COAST EROSION	5000GR0003
COAST PROTECTION	4904GR0001
COAST EROSION IN GREAT BRITAIN	4204GR0001
THE PROTECTION AND IMPROVEMENT OF FORESHORES BY THE UTILIZATION OF TIDAL AND WAVE ACTION	0306GR0001
GHOVNES	3400GR0001
CENTRAL AMERICA	
PROTECTION WORKS ON THE MEXICAN COAST THE CREATION OF BEACHES AND DUNES	5701GR0001
CONCRETE	
LAND RECLAMATION AND GROIN-BUILDING IN THE TIDAL FLATS	7009GR0004
EXPERIMENT IN SHORE PROTECTION	7105GR0001
CHARACTERISTICS OF SHINGLE BEACHES: THE SOLUTION TO SOME PRACTICAL PROBLEMS	7009GR0006
VARIATIONS IN GROIN DESIGN	6510GR0001
USE OF CONCRETE FOR SHORE PROTECTION	6204GR0002
PERMEABLE GROINS FROM ILLINOIS ON LAKE MICHIGAN	6500GR0002
SHORE PROTECTION ON THE COAST OF YALIZU	6609GR0002
PERMEABLE AND SEMIPERMEABLE GROINS FROM OHIO ON LAKE ERIE	6500GR0003
THE CREATION OF AN ARTIFICIAL BEACH IN LARVOTTO BAY MONTE CARLO PRINCIPALITY OF MONACO	6809GR0004
VARIATIONS IN GROIN DESIGN	6705GR0001

CONCRETE (CONTINUED)

REVIEW OF GERMAN EXPERIENCE ON COASTAL PROTECTION BY GROINS
 SHORE PROTECTION PLANNING AND DESIGN
 REVIEW OF BEACH EROSION AND STORM TIDE CONDITIONS IN FLORIDA 1961-1962
 GROINS FROM WISCONSIN ON LAKE MICHIGAN
 COASTAL ENGINEERING STRUCTURES
 SHEET PILE PILING FOR SHORE PROTECTION STRUCTURES
 CLIFF DRAINAGE AND BEACH DISTRIBUTION
 A PICTORIAL HISTORY OF SELECTED STRUCTURES ALONG THE NEW JERSEY COAST
 COASTAL PROCESSES
 BEACH EROSION AND PROTECTION WORKS IN IMAZU-SAKANO BEACH
 COASTAL PROTECTION WORKS AND RELATED PROBLEMS IN JAPAN
 CONCRETE SHORE PROTECTION
 FEEDER BEACHES AND GROINS RESTORE PRESQUE ISLE PENINSULA
 THE SLESET COAST PROTECTION SCHEME
 OBSERVATIONS ON THE TRAVEL OF SHORE MATERIAL ALONG A CHALK FORESHORE
 LES UVAGUES DE DEFENCE CONTRE LA MER SUR LA COTE FRANCAISE DE LOCEAN ENTRE LA LOIRE ET LA GIRONDE
 DESIGN AND CONSTRUCTION OF THE SEAL BEACH GROIN
 FLORIDA COASTAL PROBLEMS
 GROINS ON THE SHORE OF THE GREAT LAKES
 PRECAST CONCRETE BLOCK GROINS
 LAKE MICHIGAN EROSION STUDIES
 THE DANISH WESTCOAST - LITTORAL DRIFT PROBLEMS AND MEASURES AGAINST COAST EROSION
 DESIGN AND CONSTRUCTION OF GROINS
 COAST PROTECTION
 MEASURES AGAINST EROSION AT GROINS AND JETTIES
 REPORT TO THE 17TH INTERNATIONAL NAVIGATION CONGRESS
 COAST PROTECTION SOME RECENT WORKS ON THE EAST COAST 1942-52
 COAST EROSION AND PROTECTION - STUDIES IN CAUSES AND REMEDIES
 FUNDAMENTALS OF COAST EROSION AND DEFENCE
 REPORT TO THE 17TH INTERNATIONAL NAVIGATION CONGRESS
 COAST EROSION AND THE DEVELOPMENT OF BEACH PROFILES
 INFORMATION ON BEACH PROTECTION IN FLORIDA
 EROSION PROBLEMS ON THE OHIO SHORE OF LAKE ERIE
 COAST EROSION
 LOW COST SHORE PROTECTION USED ON THE GREAT LAKES
 CONCRETE BLOCKS FORM LOW-COST GROINS
 PIERS AND JETTIES OF PRECAST CONCRETE
 COAST EROSION IN GREAT BRITAIN
 EROSION OF OUR COASTAL FRONTIERS
 SHORE PROTECTION METHODS AND MATERIALS
 THE PREVENTION OF COAST EROSION
 EROSION AND PALMETTO GROINS AT NORTH POINT ST. AUGUSTINE FLORIDA
 ART OF BEACH PROTECTION
 SHOREWOOD PROTECTS ITS LAKE FRONT
 PERMEABLE JETTIES BUILT TO PROTECT CLEVELANDS SHORE
 SHORE EROSION AND CARBAGE PALMETTO GROINS AT NORTH POINT ST. AUGUSTINE FLORIDA
 THE PREVENTION OF COAST EROSION
 EFFECTIVENESS OF PERMEABLE TYPE GROINS USED FOR BEACH PROTECTION AT SHOREWOOD WISCONSIN AND OTHER CITIES ALONG T
 HE WEST SHORE OF LAKE MICHIGAN
 CALIFORNIA'S BEACH EROSION AND DEVELOPMENT PROBLEMS
 CONCRETE SHORE PROTECTION STRUCTURES
 PERMEABLE GROINS AT KENOSHA WISCONSIN
 JETTY
 EROSION OF OUR COASTAL FRONTIERS - PART II
 SHORE PROTECTION BY PERMEABLE GROINS
 REPORT OF THE FORESHORE EROSION BOARD

CONCRETE					4110GR0001
COAST EROSION STUDIES					4000GR0001
BEACH EROSION STUDIES					3309GR0001
ART OF FORMING PROTECTIVE BEACHES					3400GR0001
GROYNES					3505GR0001
JETTY					3604GR0001
ROUND-TABLE DISCUSSION					3507GR0001
A NEW METHOD OF CONSTRUCTION IN COAST EROSION CONTROL					3505GR0002
JETTY					3605GR0001
SOME DATA ON BEACH PROTECTION WORKS					0000GR0005
THE MOSENITZ PRECAST PERMEABLE GROIN					1508GR0001
COAST EROSION AND PROTECTION ON LONG ISLAND AND NEW JERSEY					0000GR0006
THE BUDD HORIZONTALLY PERMEABLE GROIN SYSTEM FOR BEACH EROSION CONTROL AND REBUILDING SAND BEACHES					2902GR0001
DETAIL OF CONCRETE BLOCK USED IN GROINS CONSTRUCTED AT MONTECITO CALIFORNIA					3012GR0001
REPORT OF ADVISORY BOARD ON BEACH PROTECTION LOS ANGELES COUNTY					2712GR0001
SEA DEFENCE EROSION AND PROTECTION ON A SANDY COAST					6204GR0003
CONST-PROBLEMS					5110GR0001
ASPHALT IN BEACH EROSION CONTROL STRUCTURES					6008GR0001
MARYLANDS FAVORITE BEACH AT OCEAN CITY					5010GR0001
SCALE EFFECTS IN MODELS WITH LITTORAL SAND DRIFT					6010GR0001
DESIGN AND CONSTRUCTION OF THE SEAL BEACH GROIN					5310GR0001
LOW COST SHORE PROTECTION USED ON THE GREAT LAKES					4806GR0001
PAPER ON PROTECTIVE WORKS ADAPTED TO LIMIT EROSION ALONG THE OPEN COAST HOW THEY WORK					5206GR0001
LIFE OF STEEL SHEET PILE STRUCTURES IN ATLANTIC COASTAL STATES					5208GR0002
THE DANISH WESTCOAST - LITTORAL DRIFT PROBLEMS AND MEASURES AGAINST COAST EROSION					5008GR0001
DETERIORATION OF STEEL SHEET PILE GROINS AT PALM BEACH FLORIDA					4910GR0001
DURABILITY OF STEEL SHEET PILING IN SHORE STRUCTURES					5202GR0001
ALL STEEL GROUYNE - MIAMI BEACH					4910GR0002
COAST PROTECTION SOME RECENT WORKS ON THE EAST COAST 1942-52					5306GR0001
CONSTRUCTION AND MAINTENANCE OF THE PUBLIC BEACH AT ROCKAWAY BEACH BOROUGH OF QUEENS					3610GR0002
SHORE PROTECTION METHODS AND MATERIALS					4410GR0002
EXPERIMENTAL STEEL SHEET PILE GROINS PALM BEACH FLORIDA					4800GR0001
STEEL SHEET PILING FOR SHORE AND BEACH PROTECTION STRUCTURES					4410GR0001
CALIFORNIA BEACH EROSION AND DEVELOPMENT PROBLEMS					3610GR0001
INVESTIGATIONS OF STEEL SHEET PILING					3607GR0002
ROUND-TABLE DISCUSSION					3604GR0001
CONST-PROCEDURE					6204GR0003
ASPHALT IN BEACH EROSION CONTROL STRUCTURES					6204GR0001
ASPHALT GROINS					6606GR0002
SHORE PROTECTION PLANNING AND DESIGN					5509GR0001
HOW TO BUILD A BEACH AT ECONOMY PRICES					6008GR0003
SHORELINE ADVANCEMENT BY SEA WALL AND GROYNES AT COCHIN					5510GR0001
MARYLANDS FAVORITE BEACH AT OCEAN CITY					6010GR0001
DESIGN AND CONSTRUCTION OF THE SEAL BEACH GROIN					5904GR0001
UNFINISHED BUSINESS NEW JERSEY GROIN PROJECT STALLED BY WINTER					5905GR0001
BEHAVIOR OF SAND ASPHALT GROINS AT OCEAN CITY MARYLAND					5509GR0001
HOW TO BUILD A BEACH AT ECONOMY PRICES					5511GR0002
ASPHALT GROINS AND JETTIES					6004GR0001
A CONTRACTOR BATTLES THE TIDES					5903GR0001
BETTER JETTY FOR LESS MONEY					5504GR0001
THE ASPHALT GROINS AT OCEAN CITY MARYLAND					5309GR0001
EXPERIMENTAL GROINS CAMP PERRY OHIO					5204GR0002
CONCRETE BLOCKS FORM LOW-COST GROINS					5306GR0001
COAST PROTECTION SOME RECENT WORKS ON THE EAST COAST 1942-52					4910GR0002
ALL STEEL GROUYNE - MIAMI BEACH					4602GR0002
PIERS AND JETTIES OF PRECAST CONCRETE					4410GR0001
STEEL SHEET PILING FOR SHORE AND BEACH PROTECTION STRUCTURES					

CONST-PROCEDURE (CONTINUED)	3807GR0004
SHOREWOOD PROTECTS ITS LAKE FRONT	4010GR0001
EROSION CONTROL AT WRIGHTSVILLE BEACH	3711GR0001
JETTY	4700GR0001
THE PROBLEM OF COAST EROSION	4507GR0001
PERMEABLE JETTIES BUILT TO PROTECT CLEVELANDS SHORE	3610GR0002
CONSTRUCTION AND MAINTENANCE OF THE PUBLIC BEACH AT ROCKAWAY BEACH BOROUGH OF QUEENS	4510GR0001
ART OF BEACH PROTECTION	3505GR0002
JETTY	3505GR0001
JETTY	3505GR0001
MESH JETTIES	3505GR0001
DIE SCHUTZBAUTEN AUF DER INSEL BORKUM	3602GR0001
THE WUSENITZ PRECAST PERMEABLE GROIN	3512GR0001
REPORT TO THE 15TH INTERNATIONAL NAVIGATION CONGRESS	0000GR0005
SEA WALLS AND GROINS OF STEEL SHEETING STABILIZE MIAMI BEACH	3100GR0002
CORNER-GROINS	3105GR0001
OCEANOGRAPHICAL ENGINEERING	6400GR0003
COASTAL DEVELOPMENT AND COASTAL PROTECTION	5511GR0001
MEASURES AGAINST EROSION AT GROINS AND JETTIES	5210GR0001
COASTAL PROTECTION REVIEW OF METHODS FOR DEFENCE	5311GR0001
DU-PLAT-TAYLOR	
COAST EROSION	4110GR0001
THE PREVENTION OF COAST EROSION	4000GR0003
COAST EROSION IN GREAT BRITAIN	4204GR0001
DU-PLAT-TAYLOR ADJUSTABLE SCREW PILE GROYNES	3306GR0001
ECONOMICS	
REVIEW OF GERMAN EXPERIENCE ON COASTAL PROTECTION BY GROINS	6307GR0002
NEW COASTAL WORKS AT NAHARIYA (ISRAEL)	6502GR0001
GROINS ON THE SHORES OF THE GREAT LAKES	6111GR0001
BETTER JETTY FOR LESS MONEY	5903GR0001
A CONTRACTOR BATTLES THE TIDES	6004GR0001
HOW TO BUILD A BEACH AT ECONOMY PRICES	5509GR0001
ASPHALT GROINS - TWO YEAR PLAN	5706GR0001
MARYLANDS FAVORITE BEACH AT OCEAN CITY	5510GR0001
DIVISION OF SHORE EROSION - OHIO	5510GR0002
BEHAVIOR OF BEACH FILL AND BURNOW AREA AT PROSPECT BEACH WEST HAVEN CONNECTICUT	6108GR0001
GROINS ON THE SHORE OF THE GREAT LAKES	6105GR0001
BEACH EROSION AND PROTECTION WORKS IN IMAZU-SAKANU BEACH	6112GR0002
FEEDER BEACHES AND GROINS RESTORE PRESQUE ISLE PENINSULA	5803GR0001
THE DANISH WESTCOAST - LITTORAL DRIFT PROBLEMS AND MEASURES AGAINST COAST EROSION	5008GR0001
DESIGN AND CONSTRUCTION OF GROINS	5010GR0001
CASE HISTORY OF SHORE PROTECTION AT PRESQUE ISLE PENINSULA PENNSYLVANIA	5210GR0003
REPORT TO THE 17TH INTERNATIONAL NAVIGATION CONGRESS	4900GR0005
DEVELOPMENT OF THE NEW JERSEY SHORE	5210GR0005
EROSION PROBLEMS ON THE OHIO SHORE OF LAKE ERIE	5204GR0001
MEASURES AGAINST EROSION AT GROINS AND JETTIES	5210GR0001
LOW COST SHORE PROTECTION USED ON THE GREAT LAKES	5310GR0001
PRECAST CONCRETE BLOCK GROINS	5304GR0001
COASTAL PROTECTION REVIEW OF METHODS FOR DEFENCE	5311GR0001
COAST PROTECTION SOME RECENT WORKS ON THE EAST COAST 1942-52	5306GR0001
REPORT TO THE 17TH INTERNATIONAL NAVIGATION CONGRESS	4900GR0003
CONCRETE BLOCKS FORM LOW-COST GROINS	5204GR0002
SOME ASPECTS OF SHORE PROTECTION IN BOSTON HARBOR	5210GR0004
THE PROBLEM OF COAST EROSION	4700GR0001
GALVESTON ISLAND SHORELINE AND THE PROTECTION OF GALVESTON BEACH	3807GR0002
EFFECTIVENESS OF GROINS AT HUCKAWAY BEACH LONG ISLAND NEW YORK	3812GR0001
REPORT ON ST.SIMON ISLAND STUDIES	4101GR0001

ECONOMICS

(CONTINUED)

EROSION CONTROL AT WRIGHTSVILLE BEACH
 REPORT ON BEACH EROSION AT HOLLYWOOD BEACH FLORIDA
 EARLY ATTEMPTS AT INLET CONSTRUCTION ON THE FLORIDA EAST COAST
 PROTECTING GALVESTON BEACH
 HAWKS NEST BEACH CONNECTICUT
 CONSTRUCTION AND MAINTENANCE OF THE PUBLIC BEACH AT ROCKAWAY BEACH BOROUGH OF QUEENS
 SHORE PROTECTION BY PERMEABLE GROINS
 REPORT ON EROSION AT MANASQUAN INLET NEW JERSEY AND ADJACENT BEACHES
 SHOREWOOD PROTECTS ITS LAKE FRONT
 PAPER ON PROTECTIVE WORKS ADAPTED TO LIMIT EROSION ALONG THE OPEN COAST HOW THEY WORK
 JACOB RIIS PARK
 SEA WALLS AND GROINS OF STEEL SHEETING STABILIZE MIAMI BEACH
 SAND MOVEMENT AND BEACH EROSION
 GALVESTON BEACH CONSTRUCTION
 SEA DEFENCE EROSION AND PROTECTION ON A SANDY COAST
 COAST PROTECTION AND PROTECTION ON LONG ISLAND AND NEW JERSEY
 THE PROTECTION AND IMPROVEMENT OF FORESHORES BY THE UTILIZATION OF TIDAL AND WAVE ACTION
 DIE SCHUTZBAUTEN AUF DER INSEL BORKUM
 CERTAIN POINTS ABOUT EROSION COSTS AND MEASURES OF PROTECTION
 PARTICIPATION OF FEDERAL RELIEF AGENCIES IN BEACH PROTECTION PROJECTS
 GROYNES

EROSION

SOME SAND TRANSPORT PHENOMENA ON COASTS WITH BARS
 THE EFFECT OF GROYNES ON ERODED BEACHES
 EXPERIMENTAL STUDY OF THE HYDRAULIC BEHAVIOR OF INCLINED GROYNE SYSTEMS
 THE DYNAMICS OF A COAST WITH A GROYNE SYSTEM
 THE PROTECTION AND PRESERVATION OF THE ATLANTIC SHORE FRONT OF THE STATE OF NEW YORK
 SEA GROINS EFFECTIVENESS INVESTIGATIONS BY DYED SAND TESTS
 REVIEW OF BEACH EROSION AND STORM TIDE CONDITIONS IN FLORIDA 1961-1962
 THE TERMINAL PROBLEM IN COAST PROTECTION
 GROINS AND EFFECTS - MINIMIZING LIABILITIES
 CLIFF DRAINAGE AND BEACH DISTRIBUTION
 EXPERIMENTAL STUDY OF THE HYDRAULIC BEHAVIOR OF GROYNE SYSTEMS
 PERMEABLE AND SEMIPERMEABLE GROINS FROM OHIO ON LAKE ERIE
 COLORED SAND TESTS WITH LUMINESCENT SAND IN GROIN FIELDS
 STABILITY OF BEACHES USING GROINS
 VARIATIONS IN GROIN DESIGN
 EFFECT OF PARTICLE SIZE AND DISTRIBUTION ON STABILITY OF ARTIFICIALLY FILLED BEACH PRESQUE ISLE PENINSULA
 PENNSYLVANIA

NEW COASTAL WORKS AT NAHARIYA (ISRAEL)
 GROINS FROM WISCONSIN ON LAKE MICHIGAN
 REPORT TO THE 22ND INTERNATIONAL NAVIGATION CONGRESS
 THE NEARSHORE MOVEMENT OF SAND AT DUBSIN
 COASTAL PROTECTION FOR FLORIDA
 EFFECTS OF LARGE STRUCTURES ON THE OHIO SHORE OF LAKE ERIE
 A PICTORIAL HISTORY OF SELECTED STRUCTURES ALONG THE NEW JERSEY COAST
 PERMEABLE GROINS FROM ILLINOIS ON LAKE MICHIGAN
 VARIATIONS IN GROIN DESIGN
 THE HISTORY OF THE DUTCH COAST IN THE LAST CENTURY
 A MODEL STUDY OF THE BEHAVIOR OF BEACHES AND GROYNES
 COASTAL ENGINEERING STRUCTURES
 THE EFFECT OF GROYNES ON STABLE BEACHES
 THE ATLANTIC COAST OF LONG ISLAND
 EMERGENCY MEASURES TO COMBAT BEACH EROSION
 EMERGENCY METHODS TO COMBAT BEACH EROSION
 A MATHEMATICAL THEORY ABOUT SAND WAVES AND ITS APPLICATION ON THE DUTCH WADDEN ISLE OF VLIeland

EROSION	(CONTINUED)	6809GR0001
THE DYNAMICS OF A COAST WITH A GROUPE SYSTEM		6204GR0002
USE OF CONCRETE FOR SHORE PROTECTION		6008GR0005
BEACH REHABILITATION BY USE OF BEACH FILLS AND FURTHER PLANS FOR THE PROTECTION OF THE ISLAND OF NORDERNEY		5803GR0001
FEEDER BEACHES AND GROINS RESTORE PRESQUE ISLE PENINSULA		6112GR0001
THE SELSEY COAST PROTECTION SCHEME		5604GR0001
BEACH EROSION CONTROL GRAND ISLE LOUISIANA		6200GR0002
BEHAVIOR OF BEACH FILLS IN NEW ENGLAND		6000GR0001
COAST EROSION AND DEFENCE		5504GR0003
STABILITY OF BEACHES		5810GR0001
AN EXPERIMENTAL STUDY ON THE EFFECT OF COASTAL GROINS		6008GR0002
THE DEVELOPMENT OF COAST PROFILES ON A RECEDED COAST PROTECTED BY GROYNES		5905GR0001
BEHAVIOR OF SAND ASPHALT GROINS AT OCEAN CITY MARYLAND		5602GR0001
BEHAVIOR OF BEACH FILL AT OCEAN CITY NEW JERSEY		6102GR0001
BEHAVIOR OF BEACH FILLS IN NEW ENGLAND		6107GR0001
A STUDY OF GROINS AND THEIR FUNCTION AS HYDRAULIC STRUCTURES		5708GR0001
ASPHALT GROINS - TWO YEAR PLAN		5700GR0002
FUNCTIONS OF GROINS FUNDAMENTAL STUDY ON BEACH SEDIMENT AFFECTED BY GROINS (1)		6008GR0001
SCALE EFFECTS IN MODELS WITH LITTORAL SAND DRIFT		6008GR0003
SHORELINE ADVANCEMENT BY SEA WALL AND GROYNES AT COCHIN		6004GR0001
A CONTRACTOR BATTLES THE TIDES		6010GR0001
DESIGN AND CONSTRUCTION OF THE SEAL BEACH GROIN		5609GR0001
ARRANGEMENT OF GROINS ON A SANDY BEACH		5810GR0002
SUMMARY STATEMENT CONCERNING IMPORTANCE OF A GROIN DESIGN CRITERION		5800GR0004
BASIC COASTAL MODEL		5906GR0001
LABORATORY STUDY OF THE EFFECT OF GROINS ON THE RATE OF LITTORAL TRANSPORT EQUIPMENT DEVELOPMENT AND INITIAL TESTS		5712GR0002
SOME COASTAL ENGINEERING PROBLEMS IN INDIA		6010GR0002
COASTAL PROTECTION IN MASSACHUSETTS		6204GR0004
COAST PROTECTION - GROUPE SYSTEMS		5000GR0001
WINDS WAVES AND MARITIME STRUCTURES		5400GR0003
REPORT TO THE 17TH INTERNATIONAL NAVIGATION CONGRESS		5201GR0001
PHOTOGRAPHS OF FORT MACON NEAR MOREHEAD CITY NORTH CAROLINA AFTER SERIES OF HURRICANES IN 1954		5010GR0002
SUMMARY REPORT ON STUDIES OF SAND TRANSPORTATION BY WAVE ACTION		5311GR0001
LITTORAL PROCESSES ON SANDY COASTS		5009GR0001
COASTAL PROTECTION REVIEW OF METHODS FOR DEFENCE		5210GR0001
SCATTERED GROINS		5500GR0001
INFORMATION ON BEACH PROTECTION IN FLORIDA		5200GR0002
CONCRETE SHORE PROTECTION		5109GR0001
COAST EROSION AND PROTECTION - STUDIES IN CAUSES AND REMEDIES		5306GR0001
BEACH PROTECTION ENGINEERS ATTEMPT TO OUTWIT NATURE AT PRESQUE ISLE PENINSULA		5210GR0003
COAST PROTECTION SOME RECENT WORKS ON THE EAST COAST 1942-52		4900GR0003
CASE HISTORY OF SHORE PROTECTION AT PRESQUE ISLE PENINSULA PENNSYLVANIA		5000GR0003
REPORT TO THE 17TH INTERNATIONAL NAVIGATION CONGRESS		5406GR0001
COAST EROSION		5210GR0001
COAST EROSION AND THE DEVELOPMENT OF BEACH PROFILES		5008GR0001
MEASURES AGAINST EROSION AT GROINS AND JETTIES		5101GR0002
THE DANISH WESTCOAST - LITTORAL DRIFT PROBLEMS AND MEASURES AGAINST COAST EROSION		4900GR0005
INFLUENCE OF GROINS ON BEACH STABILIZATION		5300GR0001
REPORT TO THE 17TH INTERNATIONAL NAVIGATION CONGRESS		4001GR0002
LAKE MICHIGAN EROSION STUDIES		3907GR0001
CURVED JETTIES SEA WALLS BULKHEADS AND RETAINING WALLS		3801GR0002
SHORE PROTECTION BY PERMEABLE GROINS		4806GR0001
REPORT ON EROSION AT MANASQUAN INLET NEW JERSEY AND ADJACENT BEACHES		3710GR0001
PAPER ON PROTECTIVE WORKS ADAPTED TO LIMIT EROSION ALONG THE OPEN COAST HOW THEY WORK		4000GR0001
ROUND-TABLE DISCUSSION OF SHORE PROBLEMS IN RELATION TO RECREATION		
BEACH EROSION STUDIES		

EROSION

(CONTINUED)

COAST EROSION
PERMEABLE GROINS AT KENOSHA WISCONSIN
EFFECTIVENESS OF GROINS AT ROCKAWAY BEACH LONG ISLAND NEW YORK
SHOREWOOD PROTECTS ITS LAKE FRONT
REPORT OF THE FORESHORE EROSION BOARD
COAST PROTECTION ON THE NORTH SEA COASTS OF HOLLAND FRANCE BELGIUM AND GERMANY
HAWKS NEST BEACH CONNECTICUT
THE RELATION OF THE ACTION OF WAVES AND CURRENTS ON HEADLANDS TO THE CONTROL OF SHORE EROSION BY GROINS
PIERS AND JETTIES OF PRECAST CONCRETE
THE PREVENTION OF COAST EROSION
WAVE ACTION ON BEACHES
EROSION AND PALMETTO GROINS AT NORTH POINT ST.AUGUSTINE FLORIDA
ART OF BEACH PROTECTION
EARLY ATTEMPTS AT INLET CONSTRUCTION ON THE FLORIDA EAST COAST
SHORE EROSION AND CABBAGE PALMETTO GROINS AT NORTH POINT ST.AUGUSTINE FLORIDA
REPORT ON SHORE EROSION AT TILGHMAN POINT MARYLAND
THE ACTION OF GROINS ON BEACH STABILIZATION
EROSION OF OUR COASTAL FRONTIERS
THE PROBLEM OF COAST EROSION
RECENT STORM DAMAGE ALONG THE COASTS OF FLORIDA AND MISSISSIPPI
JETTY
ONE ASPECT OF THE DYNAMICS OF A COAST PARTLY PROTECTED BY A ROW OF GROYNES
DIE SCHUTZBAUTEN AUF DER INSEL BORKUM
THE COASTAL DYNAMICS OF SAND WAVES AND THE INFLUENCE OF BREAKWATERS AND GROYNES
INFLUENCE OF PROTECTIVE WORKS ON THE EROSION OF THE WEST COAST OF SVLT NORTH SEA COAST OF GERMANY
THE PROTECTION AND IMPROVEMENT OF FORESHORES BY THE UTILIZATION OF TIDAL AND WAVE ACTION
THE WOSENITZ PRECAST PERMEABLE GROIN
MAN AGAINST THE SEA A GUIDE TO EROSION CONTROL
CALIFORNIA'S BEACH EROSION AND DEVELOPMENT PROBLEMS
CONSTRUCTION AND MAINTENANCE OF THE PUBLIC BEACH AT ROCKAWAY BEACH BOROUGH OF QUEENS
TEST WITH SCALE MODELS TO DETERMINE THE EFFECT OF CURRENTS AND BREAKERS UPON A SANDY BEACH AND THE ADVANTAGEOUS
INSTALLATION OF GROINS
THE NORTH SEAS VERSUS LAKE MICHIGAN
PROTECTION OF COASTS AGAINST THE SEA WITH OR WITHOUT PREPONDERATING COASTAL DRIFT OF MATERIALS
REPORT TO THE 15TH INTERNATIONAL NAVIGATION CONGRESS
JACOB RIIS PARK
REPORT OF ADVISORY BOARD ON BEACH PROTECTION LOS ANGELES COUNTY

EUROPE
LAND RECLAMATION AND GROIN-BUILDING IN THE TIDAL FLATS
THE EFFECT OF GROYNES ON ERODED BEACHES
CHARACTERISTICS OF SHINGLE BEACHES: THE SOLUTION TO SOME PRACTICAL PROBLEMS
EXPERIMENTAL STUDY OF THE HYDRAULIC BEHAVIOR OF INCLINED GROYNÉ SYSTEMS
CLIFF DRAINAGE AND BEACH DISTRIBUTION
THE TERMINAL PROBLEM IN COAST PROTECTION
SOME SAND TRANSPORT PHENOMENA ON COASTS WITH BARS
THE CREATION OF AN ARTIFICIAL BEACH IN LARVOTTO BAY MONTE CARLO PRINCIPALITY OF MONACO
THE HISTORY OF THE DUTCH COAST IN THE LAST CENTURY
THE EFFECT OF GROYNES ON STABLE BEACHES
REPORT TO THE 22ND INTERNATIONAL NAVIGATION CONGRESS
MODEL STUDIES IN SITU OBSERVATIONS
COLORED SAND TESTS WITH LUMINESCENT SAND IN GROIN FIELDS
COASTAL PROTECTION FOR FLORIDA
REPORT TO THE 22ND INTERNATIONAL NAVIGATION CONGRESS
SEA GROINS EFFECTIVENESS INVESTIGATIONS BY DYED SAND TESTS
BEACH REHABILITATION BY USE OF BEACH FILLS AND FURTHER PLANS FOR THE PROTECTION OF THE ISLAND OF NORDERNEY
CURVED GROINS AND FORESHORE DEFENCE

EUROPE

(CONTINUED)

COAST PROTECTION - GROUPE SYSTEMS

- COAST EROSION AND DEFENCE
- TIMBER IN THE CONSTRUCTION OF SEA DEFENCE AND RIVER WORKS
- GENERALITIES ON COASTAL PROCESSES AND PROTECTION
- THE SELSEY COAST PROTECTION SCHEME
- SCALE EFFECTS IN MODELS WITH LITTORAL SAND DRIFT
- REPORT TO THE 17TH INTERNATIONAL NAVIGATION CONGRESS
- FUNDAMENTALS OF COAST EROSION AND DEFENCE
- PROBLEMS DE DEFENSE DES COTES RESUSITE DE ECHECS DE QUELQUES OUVRAGES
- REPORT TO THE 18TH INTERNATIONAL NAVIGATION CONGRESS
- REPORT TO THE 17TH INTERNATIONAL NAVIGATION CONGRESS
- SCATTERED GROINS
- COAST EROSION
- REPORT TO THE 17TH INTERNATIONAL NAVIGATION CONGRESS
- MEASURES AGAINST EROSION AT GROINS AND JETTIES
- APPLICATION OF ASPHALT IN HYDRAULIC ENGINEERING WORKS
- COAST PROTECTION SOME RECENT WORKS ON THE EAST COAST 1942-52
- COAST EROSION AND THE DEVELOPMENT OF BEACH PROFILES
- THE DANISH WESTCOAST - LITTORAL DRIFT PROBLEMS AND MEASURES AGAINST COAST EROSION
- COAST EROSION AND PROTECTION - STUDIES IN CAUSES AND REMEDIES
- BITUMEN IN COASTAL ENGINEERING
- COAST PROTECTION
- COASTAL PROTECTION REVIEW OF METHODS FOR DEFENCE
- INFORMATION ON BEACH PROTECTION IN FLORIDA
- WINDS WAVES AND MARITIME STRUCTURES
- OBSERVATIONS ON THE TRAVEL OF SHORE MATERIAL ALONG A CHALK FORESHORE
- STEEL SHEET PILING FOR SHORE AND BEACH PROTECTION STRUCTURES
- THE PROBLEM OF COAST EROSION
- COAST EROSION IN GREAT BRITAIN
- THE PREVENTION OF COAST EROSION
- THE PREVENTION OF COAST EROSION
- COAST EROSION
- SHORE PROTECTION METHODS AND MATERIALS
- COAST PROTECTION ON THE NORTH SEA COASTS OF HOLLAND FRANCE BELGIUM AND GERMANY
- SOME SEA DEFENCE WORKS FOR RECLAIMED LANDS
- REPORT TO THE 15TH INTERNATIONAL NAVIGATION CONGRESS
- REPORT TO THE 15TH INTERNATIONAL NAVIGATION CONGRESS
- DU-PLAT-TAYLOR ADJUSTABLE SCREW PILE GROYNES
- TEST WITH SCALE MODELS TO DETERMINE THE EFFECT OF CURRENTS AND BREAKERS UPON A SANDY BEACH AND THE ADVANTAGEOUS INSTALLATION OF GROINS
- SEA DEFENCE EROSION AND PROTECTION ON A SANDY COAST
- THE PROTECTION AND IMPROVEMENT OF FORESHORES BY THE UTILIZATION OF TIDAL AND WAVE ACTION
- INFLUENCE OF PROTECTIVE WORKS ON THE EROSION OF THE WEST COAST OF SYLT NORTH SEA COAST OF GERMANY
- GROYNES
- EXPERIMENTAL
- THE EFFECT OF GROYNES ON ERODED BEACHES
- EXPERIMENT IN SHORE PROTECTION
- VARIATION OF TOPOGRAPHY OF SEA-BED CAUSED BY THE CONSTRUCTION OF BREAKWATERS
- COLORLED SAND TESTS WITH LUMINESCENT SAND IN GROIN FIELDS
- REPORT TO THE 22ND INTERNATIONAL NAVIGATION CONGRESS
- MODEL STUDIES IN SITU OBSERVATIONS
- EXPERIMENTAL STUDY OF THE HYDRAULIC BEHAVIOR OF GROUPE SYSTEMS
- EXPERIMENTAL STUDY OF THE HYDRAULIC BEHAVIOR OF INCLINED GROUPE SYSTEMS
- SOME SAND TRANSPORT PHENOMENA ON COASTS WITH BARS
- THE EFFECT OF GROYNES ON STABLE BEACHES

6204GR00004
6006GR00001
6006GR00002
5903GR00003
6112GR00001
6006GR00001
4900GR00005
5409GR00001
5409GR00003
5300GR00003
4900GR00004
5009GR00001
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4900GR00001
5210GR00001
5101GR00001
5304GR00001
5406GR00001
5006GR00001
5200GR00002
5409GR00002
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5210GR00008
5000GR00001
5409GR00005
4410GR00001
4700GR00001
4204GR00001
4104GR00001
4000GR00003
4110GR00001
4410GR00002
3703GR00001
4602GR00001
3100GR00001
3100GR00002
3305GR00001

2805GR00001
2712GR00001
0305GR00001
0005GR00003
3400GR00001

7005GR00005
7105GR00001
7005GR00007
7000GR00001
6900GR00001
7000GR00003
6809GR00003
7009GR00003
7009GR00003
6809GR00002

EXPERIMENTAL

(CONTINUED)

SCOURING DUE TO WAVE ACTION AT THE TOE OF PERMEABLE COASTAL STRUCTURES
STABILIZATION OF SHINGLE ALLUVIAL SHORES BY GROINS OF FULL PROFILE
DIVISION OF SHORE EROSION - OHIO
A MODEL STUDY OF THE BEHAVIOR OF BEACHES AND GROYNES
FEEDER BEACHES AND GROINS RESTORE PRESQUE ISLE PENINSULA
COAST EROSION AND DEFENCE
AN EXPERIMENTAL STUDY ON THE EFFECT OF COASTAL GROINS
MOTION OF SAND PARTICLES BETWEEN GROINS
COAST PROTECTION - GROYNES SYSTEMS
SCALE EFFECTS IN MODELS WITH LITTORAL SAND DRIFT
BASIC COASTAL MODEL

A STUDY OF GROINS AND THEIR FUNCTION AS HYDRAULIC STRUCTURES

SOME COASTAL ENGINEERING PROBLEMS IN INDIA

ARRANGEMENT OF GROINS ON A SANDY BEACH

FUNCTIONS OF GROINS FUNDAMENTAL STUDY ON BEACH SEDIMENT AFFECTED BY GROINS (1)

LABORATORY STUDY OF THE EFFECT OF GROINS ON THE RATE OF LITTORAL TRANSPORT EQUIPMENT DEVELOPMENT AND INITIAL T

ESTS

SUMMARY REPORT ON STUDIES OF SAND TRANSPORTATION BY WAVE ACTION

EXPERIMENTAL GROINS CAMP PERRY OHIO

INFLUENCE OF GROINS ON BEACH STABILIZATION

DETERIORATION OF STEEL SHEET PILE GROINS AT PALM BEACH FLORIDA

MEASURES AGAINST EROSION AT GROINS AND JETTIES

EXPERIMENTAL STEEL SHEET PILE GROINS PALM BEACH FLORIDA

THE ACTION OF GROINS ON BEACH STABILIZATION

TEST WITH SCALE MODELS TO DETERMINE THE EFFECT OF CURRENTS AND BREAKERS UPON A SANDY BEACH AND THE ADVANTAGEOUS INSTALLATION OF GROINS

FIELD

EXPERIMENT IN SHORE PROTECTION

VARIATION OF TOPOGRAPHY OF SEA-BED CAUSED BY THE CONSTRUCTION OF BREAKWATERS

USE OF LONG GROINS AS ARTIFICIAL HEADLANDS

AERIAL PHOTOGRAPHS OF WALLS SAND STATE BEACH RYE NEW HAMPSHIRE

GROINS FROM WISCONSIN ON LAKE MICHIGAN

STABILIZATION OF SHINGLE ALLUVIAL SHORES BY GROINS OF FULL PROFILE

SOME SAND TRANSPORT PHENOMENA ON COASTS WITH BARS

A MATHEMATICAL THEORY ABOUT SAND WAVES AND ITS APPLICATION ON THE DUTCH WADDEN ISLE OF VLIELAND

COASTAL ENGINEERING STRUCTURES

VARIATIONS IN GROIN DESIGN

PERMEABLE GROINS FROM ILLINOIS ON LAKE MICHIGAN

LITTORAL PROCESSES AND THE DEVELOPMENT OF SHORELINES

THE HISTORY OF THE DUTCH COAST IN THE LAST CENTURY

PERMEABLE AND SEMIPERMEABLE GROINS FROM OHIO ON LAKE ERIE

STABILITY OF BEACHES USING GROINS

VARIATIONS IN GROIN DESIGN

REVIEW OF BEACH EROSION AND STORM TIDE CONDITIONS IN FLORIDA 1961-1962

SEA GROINS EFFECTIVENESS INVESTIGATIONS BY DYED SAND TESTS

SHORE PROTECTION EXPERIENCE IN THE UNITED STATES

CHARACTERISTICS OF SHINGLE BEACHES: THE SOLUTION TO SOME PRACTICAL PROBLEMS

BEACH REHABILITATION BY USE OF BEACH FILLS AND FURTHER PLANS FOR THE PROTECTION OF THE ISLAND OF NORDERNEY

COASTAL PROTECTION IN MASSACHUSETTS

PHOTOGRAPHS OF SASCO HILL BEACH FAIRFIELD CONNECTICUT AFTER GROIN CONSTRUCTION AND BEFORE FILL PLACEMENT

COASTAL DEVELOPMENT AND COASTAL PROTECTION

SOME COASTAL ENGINEERING PROBLEMS IN INDIA

THE NEARSHORE MOVEMENT OF SAND AT DURBIN

SHORELINE ADVANCEMENT BY SEA WALL AND GROYNES AT COCHIN

BEHAVIOR OF BEACH FILLS IN NEW ENGLAND

CURVED GROINS AND FORESHORE DEFENCE

6609GR0001
6400GR0001
5510GR0002
6206GR0001
5803GR0001
6000GR0001
5810GR0001
5812GR0001
6204GR0004
6008GR0001
5800GR0004
6107GR0001
5712GR0002
5609GR0001
5700GR0002
5906GR0001
5201GR0001
5309GR0001
5101GR0002
4910GR0001
5210GR0001
4800GR0001
4804GR0001
2806GR0001
7105GR0001
7009GR0007
6510GR0002
6306GR0001
6500GR0001
6400GR0001
7009GR0002
6810GR0001
6307GR0001
6705GR0001
6500GR0002
6510GR0004
7009GR0001
6500GR0003
6406GR0001
6510GR0001
6211GR0001
6600GR0001
6707GR0001
7009GR0006
6008GR0005
6010GR0002
5705GR0002
5511GR0001
6207GR0001
6008GR0003
6102GR0001
5607GR0002

FIELD	(CONTINUEU)	5905GR0001
	BEHAVIOR OF SAND ASPHALT GROINS AT OCEAN CITY MARYLAND	5607GR0001
	INTERIM REPORT ON ASPHALT GROINS AT OCEAN CITY MARYLAND	6200GR0002
	BEHAVIOR OF BEACH FILLS IN NEW ENGLAND	6204GR0004
	COAST PROTECTION - GROUYE SYSTEMS	6008GR0001
	SCALE EFFECTS IN MODELS WITH LITTORAL SAND DRIFT	5705GR0001
	PHOTOGRAPHS OF COMPO BEACH WESTPORT CONNECTICUT AFTER GROIN CONSTRUCTION AND BEFORE FILL PLACEMENT	6112GR0001
	THE SELSEY COAST PROTECTION SCHEME	6108GR0001
	BEHAVIOR OF BEACH FILL AND BORROW AREA AT PRESPECT BEACH WEST HAVEN CONNECTICUT	6008GR0004
	COASTAL PROTECTION WORKS AND RELATED PROBLEMS IN JAPAN	5602GR0001
	THE DEVELOPMENT OF COAST PROFILES ON A RECEDING COAST PROTECTED BY GROYNES	6208GR0001
	BEHAVIOR OF BEACH FILL AT OCEAN CITY NEW JERSEY	5812GR0002
	AERIAL PHOTOGRAPHS PLUM ISLAND MASSACHUSETTS	6204GR0002
	PROTECTING OUR SHORE LINE	6105GR0001
	USE OF CONCRETE FOR SHORE PROTECTION	5510GR0001
	GROINS ON THE SHORE OF THE GREAT LAKES	5900GR0003
	DIVISION OF SHORE EROSION - OHIO	5803GR0001
	LITTORAL-DRIFT PROBLEM AT SHORE-LINE HARBORS	6010GR0001
	FEEDER BEACHES AND GROINS-RESTORE PRESQUE ISLE PENINSULA	5210GR0004
	DESIGN AND CONSTRUCTION OF THE SEAL BEACH GROIN	5210GR0001
	SOME ASPECTS OF SHORE PROTECTION IN BOSTON HARBOR	5202GR0001
	MEASURES AGAINST EROSION AT GROINS AND JETTIES	5210GR0005
	DURABILITY OF STEEL SHEET PILING IN SHORE STRUCTURES	5300GR0003
	DEVELOPMENT OF THE NEW JERSEY SHORE	5210GR0003
	REPORT TO THE 18TH INTERNATIONAL NAVIGATION CONGRESS	4910GR0001
	CASE HISTORY OF SHORE PROTECTION AT PRESQUE ISLE PENINSULA PENNSYLVANIA	5200GR0002
	DETERIORATION OF STEEL SHEET PILE GROINS AT PALM BEACH FLORIDA	5300GR0001
	COAST EROSION AND PROTECTION - STUDIES IN CAUSES AND REMEDIES	5101GR0001
	LAKE MICHIGAN EROSION STUDIES	5406GR0001
	APPLICATION OF ASPHALT IN HYDRAULIC ENGINEERING WORKS	5210GR0002
	COAST EROSION AND THE DEVELOPMENT OF BEACH PROFILES	5109GR0001
	LIFE OF STEEL SHEET PILE STRUCTURES IN ATLANTIC COASTAL STATES	5204GR0002
	BEACH PROTECTION ENGINEERS ATTEMPT TO OUIWIT NATURE AT PRESQUE ISLE PENINSULA	5309GR0001
	EXPERIMENTAL GROINS CAMP PERRY OHIO	5306GR0001
	CONCRETE BLOCKS FORM LOW-COST GROINS	5304GR0001
	COAST PROTECTION SOME RECENT WORKS ON THE EAST COAST 1942-52	5009GR0001
	PRECAST CONCRETE BLOCK GROINS	5311GR0001
	SCATTERED GROINS	5204GR0001
	COASTAL PROTECTION REVIEW OF METHODS FOR DEFENCE	5409GR0004
	EROSION PROBLEMS ON THE OHIO SHORE OF LAKE ERIE	5409GR0001
	LES OUVRAGES OF DEFENCE CONTRE LA MER SUR LA COTE FRANCAISE DE LOCEAN ENTRE LA LOIRE ET LA GIRONDE	3804GR0001
	FUNDAMENTALS OF COAST EROSION AND DEFENCE	3912GR0001
	EROSION OF OUR COASTAL FRONTIERS	4700GR0001
	EROSION AND PALMETTO GROINS AT NORTH POINT ST.AUGUSTINE FLORIDA	4806GR0001
	THE PROBLEM OF COAST EROSION	4206GR0001
	PAPER ON PROTECTIVE WORKS ADAPTED TO LIMIT EROSION ALONG THE OPEN COAST HOW THEY WORK	3812GR0001
	BEACH PROTECTION MEASURES	3807GR0004
	EFFECTIVENESS OF GROINS AT ROCKAWAY BEACH LONG ISLAND NEW YORK	3911GR0001
	SHOREWOOD PROTECTS ITS LAKE FRONT	3806GR0001
	EFFECTIVENESS OF PERMEABLE TYPE GROINS USED FOR BEACH PROTECTION AT SHOREWOOD WISCONSIN AND OTHER CITIES ALONG T	4800GR0001
	HE WEST SHORE OF LAKE MICHIGAN	3811GR0001
	SHORE PROTECTIVE WORK AT WINTHROP MASSACHUSETTS	4001GR0001
	SHORE PROTECTIVE WORK AT WINTHROP MASSACHUSETTS	4410GR0003
	EXPERIMENTAL STEEL SHEET PILE GROINS PALM BEACH FLORIDA	
	SHORE EROSION AND CARRABGE PALMETTO GROINS AT NORTH POINT ST.AUGUSTINE FLORIDA	
	PERMEABLE GROINS AT KENOSHA WISCONSIN	
	CONCRETE SHORE PROTECTION STRUCTURES	

REPORT ON EROSION AT MANASQUAN INLET NEW JERSEY AND ADJACENT BEACHES

PROTECTING GALTVESTON BEACH

EROSION OF OUR COASTAL FRONTIERS - PART II

COAST PROTECTION ON THE NORTH SEA COASTS OF HOLLAND FRANCE BELGIUM AND GERMANY

BEACH EROSION STUDIES

SEA DEFENCE EROSION AND PROTECTION ON A SANDY COAST

CONEY ISLAND PUBLIC BEACH AND BOARDWALK IMPROVEMENT

THE NORTH SHORE VERSUS LAKE MICHIGAN

REPORT TO THE 15TH INTERNATIONAL NAVIGATION CONGRESS

GROYNES

INVESTIGATIONS OF STEEL SHEET PILING

DIE SCHUTZBAUTEN AUF DER INSEL BORKUM

THE PROTECTION AND IMPROVEMENT OF FORESHORES BY THE UTILIZATION OF TIDAL AND WAVE ACTION

CONSTRUCTION AND MAINTENANCE OF THE PUBLIC BEACH AT ROCKAWAY BEACH BOROUGH OF QUEENS

THE WOSENITZ PRECAST PERMEABLE GROIN

THE BUDD HORIZONTAL PERMEABLE GROIN SYSTEM FOR BEACH EROSION CONTROL AND REBUILDING SAND BEACHES

GEOMETRIC-SHAPES

VARIATIONS IN GROIN DESIGN

MARITIME AND RIPARIAN USE OF GABIONS

VARIATIONS IN GROIN DESIGN

REPORT TO THE 21ST INTERNATIONAL NAVIGATION CONGRESS

SHORE PROTECTION PLANNING AND DESIGN

USE OF CONCRETE FOR SHORE PROTECTION

BEACH EROSION AND PROTECTION WORKS IN IMAZU-SAKANO BEACH

GROINS ON THE SHORE OF THE GREAT LAKES

CONCRETE SHORE PROTECTION

DETAIL OF CONCRETE BLOCK USED IN GROINS CONSTRUCTED AT MONTECITO CALIFORNIA

GREAT LAKES

EFFECT OF PARTICLE SIZE AND DISTRIBUTION ON STABILITY OF ARTIFICIALLY FILLED BEACH PRESQUE ISLE PENINSULA

PENNSYLVANIA

PERMEABLE AND SEMIPERMEABLE GROINS FROM OHIO ON LAKE ERIE

PERMEABLE GROINS FROM ILLINOIS ON LAKE MICHIGAN

VARIATIONS IN GROIN DESIGN

SHORE PROTECTION EXPERIENCE IN THE UNITED STATES

VARIATIONS IN GROIN DESIGN

EFFECTS OF LARGE STRUCTURES ON THE OHIO SHORE OF LAKE ERIE

SHEET STEEL PILING FOR SHORE PROTECTION STRUCTURES

GROINS FROM WISCONSIN ON LAKE MICHIGAN

USE OF CONCRETE FOR SHORE PROTECTION

GROINS ON THE SHORE OF THE GREAT LAKES

GROINS ON THE SHORE OF THE GREAT LAKES

DIVISION OF SHORE EROSION - OHIO

FEEDER BEACHES AND GROINS RESTORE PRESQUE ISLE PENINSULA

PROTECTING OUR SHORE LINE

PRINCIPLES OF SHORE PROTECTION FOR THE GREAT LAKES

BEACH PROTECTION ENGINEERS ATTEMPT TO OUTWIT NATURE AT PRESQUE ISLE PENINSULA

EXPERIMENTAL GROINS CAMP PERRY OHIO

FILLING PATTERN OF THE FORT SHERIDAN GROIN SYSTEM

WINDS WAVES AND MARITIME STRUCTURES

COAST EROSION AND PROTECTION - STUDIES IN CAUSES AND REMEDIES

COAST PROTECTION

LOW COST SHORE PROTECTION USED ON THE GREAT LAKES

LAKE MICHIGAN EROSION STUDIES

EROSION PROBLEMS ON THE OHIO SHORE OF LAKE ERIE

PERMEABLE GROINS AT KENOSHA WISCONSIN

3801GR00002
3807GR00005
4405GR00001
3703GR00001
4000GR00001
2712GR00001
2300GR00001
3011GR00001
3100GR00001
3400GR00001
3607GR00002
3512GR00002
0305GR00001
3610GR00002
0000GR00005
0000GR00006
6705GR00001
6512GR00001
6510GR00001
6500GR00004
6606GR00002
6204GR00002
6112GR00002
6105GR00001
5500GR00001
2902GR00001

6805GR00001
6500GR00003
6500GR00002
6510GR00001
6707GR00001
6705GR00001
6400GR00002
6210GR00001
6500GR00001
6204GR00002
6105GR00001
6111GR00001
5510GR00002
5803GR00001
5812GR00002
5310GR00002
5109GR00001
5309GR00003
5310GR00003
5000GR00001
5200GR00002
4904GR00001
5310GR00001
5300GR00001
5204GR00001
4001GR00001

GREAT LAKES	(CONTINUED)	3911GR0001
EFFECTIVENESS OF PERMEABLE TYPE GROINS USED FOR BEACH PROTECTION AT SHOREWOOD WISCONSIN AND OTHER CITIES ALONG T	THE WEST SHORE OF LAKE MICHIGAN	3807GR0004
	SHOREWOOD PROTECTS ITS LAKE FRONT	4405GR0001
	EROSION OF OUR COASTAL FRONTIERS - PART II	4410GR0003
	CONCRETE SHORE PROTECTION STRUCTURES	4507GR0001
	PERMEABLE JETTIES BUILT TO PROTECT CLEVELANDS SHORE	4300GR0001
	THE RELATION OF THE ACTION OF WAVES AND CURRENTS ON HEADLANDS TO THE CONTROL OF SHORE EROSION BY GROINS	4210GR0001
	BEACH PROTECTION MEASURES	3907GR0001
	SHORE PROTECTION BY PERMEABLE GROINS	4602GR0002
	PIERS AND JETTIES OF PRECAST CONCRETE	4510GR0001
	ART OF BEACH PROTECTION	4206GR0001
	BEACH PROTECTION MEASURES	3804GR0001
	EROSION OF OUR COASTAL FRONTIERS	3011GR0001
	THE NORTH SHORE VERSUS LAKE MICHIGAN	3309GR0001
	ART OF FORMING PROTECTIVE BEACHES	
HAUPT	A PICTORIAL HISTORY OF SELECTED STRUCTURES ALONG THE NEW JERSEY COAST	6410GR0001
	MARYLANDS FAVORITE BEACH AT OCEAN CITY	5510GR0001
	HAWAIIAN ISLANDS	
	VARIATIONS IN GROIN DESIGN	6705GR0001
	VARIATIONS IN GROIN DESIGN	6510GR0001
HIGH	CHARACTERISTICS OF SINGLE BEACHES: THE SOLUTION TO SOME PRACTICAL PROBLEMS	7009GR0006
	VARIATIONS IN GROIN DESIGN	6705GR0001
	MARITIME AND RIPARIAN USE OF GABIONS	6512GR0001
	OCEANOGRAPHICAL ENGINEERING	6400GR0003
	PERMEABLE AND SEMIPERMEABLE GROINS FROM OHIO ON LAKE ERIE	6500GR0003
	SHORE PROTECTION ON THE COAST OF YAIUZO	6609GR0002
	GROINS FROM WISCONSIN ON LAKE MICHIGAN	6500GR0001
	EXPERIMENT IN SHORE PROTECTION	7105GR0001
	STRUCTURES FOR SHORE PROTECTION	6307GR0003
	REVIEW OF BEACH EROSION AND STORM TIDE CONDITIONS IN FLORIDA 1961-1962	6211GR0001
	COASTAL ENGINEERING STRUCTURES	6307GR0001
	SHORE PROTECTION PLANNING AND DESIGN	6606GR0002
	THE ATLANTIC COAST OF LONG ISLAND	6809GR0007
	COASTAL PROCESSES	6606GR0001
	AERIAL PHOTOGRAPHS OF WALLIS SAND STATE BEACH RYE NEW HAMPSHIRE	6306GR0001
	VARIATIONS IN GROIN DESIGN	6510GR0001
	THE EFFECT OF GROYNES ON STABLE BEACHES	6809GR0002
	A PICTORIAL HISTORY OF SELECTED STRUCTURES ALONG THE NEW JERSEY COAST	6410GR0001
	COASTAL ENGINEERING STUDY AT POMPAU BEACH	5903GR0002
	BASIC COASTAL MODEL	5800GR0004
	THE ORIGIN AND STABILITY OF BEACHES	5712GR0003
	SUMMARY STATEMENT CONCERNING IMPORTANCE OF A GROIN DESIGN CRITERION	5810GR0002
	COAST PROTECTION - GROYNES SYSTEMS	6204GR0004
	PROTECTING OUR SHORE LINE	5812GR0002
	A MODEL STUDY OF THE BEHAVIOR OF BEACHES AND GROYNES	6206GR0001
	INFORMATION ON BEACH PROTECTION IN FLORIDA	5210GR0008
	INFLUENCE OF GROINS ON BEACH STABILIZATION	5101GR0002
	SUMMARY REPORT ON STUDIES OF SAND TRANSPORTATION BY WAVE ACTION	5201GR0001
	LAKE MICHIGAN EROSION STUDIES	5300GR0001
	MARYLANDS FAVORITE BEACH AT OCEAN CITY	5510GR0001
	WINDS WAVES AND MARITIME STRUCTURES	5000GR0001
	FUNDAMENTALS OF COAST EROSION AND DEFENCE	5409GR0001
	COAST EROSION AND PROTECTION - STUDIES IN CAUSES AND REMEDIES	5200GR0002
	DESIGN AND CONSTRUCTION OF GROINS	5010GR0001

COAST EROSION	5006GR0003
THE PREVENTION OF COAST EROSION	4104GR0001
COAST EROSION IN GREAT BRITAIN	4204GR0001
THE RELATION OF THE ACTION OF WAVES AND CURRENTS ON HEADLANDS TO THE CONTROL OF SHORE EROSION BY GROINS	4300GR0001
SHORE PROTECTION METHODS AND MATERIALS	4410GR0002
BEACH PROTECTION MEASURES	4206GR0001
SHORE EROSION AND CABBAGE PALMETTO GROINS AT NORTH POINT ST. AUGUSTINE FLORIDA	3811GR0001
THE PREVENTION OF COAST EROSION	4000GR0003
WAVE ACTION ON BEACHES	4806GR0002
EROSION OF OUR COASTAL FRONTIERS	3804GR0001
THE PROBLEM OF COAST EROSION	4700GR0001
BEACH PROTECTION MEASURES	3807GR0004
SHOREWOOD PROTECTS ITS LAKE FRONT	4210GR0001
THE ACTION OF GROINS ON BEACH STABILIZATION	3807GR0004
EFFECTIVENESS OF PERMEABLE TYPE GROINS USED FOR BEACH PROTECTION AT SHOREWOOD WISCONSIN AND OTHER CITIES ALONG T	4804GR0001
HE WEST SHORE OF LAKE MICHIGAN	3911GR0001
PIERS AND JETTIES OF PRECAST CONCRETE	4602GR0002
REPORT TO THE 17TH INTERNATIONAL NAVIGATION CONGRESS	4900GR0003
EROSION AND PALMETTO GROINS AT NORTH POINT ST. AUGUSTINE FLORIDA	3912GR0001
COAST EROSION	4110GR0001
REPORT TO THE 17TH INTERNATIONAL NAVIGATION CONGRESS	4900GR0005
PAPERS ON PROTECTIVE WORKS ADAPTED TO LIMIT EROSION ALONG THE OPEN COAST HOW THEY WORK	4806GR0001
GROYNES	3400GR0001
PARTICIPATION OF FEDERAL RELIEF AGENCIES IN BEACH PROTECTION PROJECTS	3607GR0001
A NEW METHOD OF CONSTRUCTION IN COAST EROSION CONTROL	3507GR0001
THE PROTECTION AND IMPROVEMENT OF FORESHORES BY THE UTILIZATION OF TIDAL AND WAVE ACTION	0304GR0001
COAST EROSION AND PROTECTION ON LONG ISLAND AND NEW JERSEY	1508GR0001
THE NORTH SHORE VERSUS LAKE MICHIGAN	3011GR0001
CONEY ISLAND PUBLIC BEACH AND BOARDWALK IMPROVEMENT	2300GR0001
INVESTIGATIONS OF STEEL SHEET PILING	3607GR0002
REPORT OF ADVISORY BOARD ON BEACH PROTECTION LOS ANGELES COUNTY	3012GR0001
CALIFORNIA'S BEACH EROSION AND DEVELOPMENT PROBLEMS	3610GR0001
SAND MOVEMENT AND BEACH EROSION	3106GR0001
HOUSE DOCUMENT	
NA - OCRACOKE ISLAND NORTH CAROLINA	6503GR0001
NA - ATLANTIC COAST OF LONG ISLAND FIRE ISLAND INLET AND SHORE WESTERLY TO JONES INLET NEW YORK	6503GR0002
NA - PERTH AMBOY NEW JERSEY BEACH EROSION CONTROL STUDY	6505GR0002
NA - ATLANTIC CITY NEW JERSEY BEACH EROSION CONTROL STUDY	6407GR0002
NA - SPECIAL STUDY OF CITY OF SAN DIEGO (SUNSET CLIFFS) CALIFORNIA	6608GR0001
NA - FALMOUTH MASSACHUSETTS	6407GR0003
NA - STATEN ISLAND FORT WADSWORTH TO ARTHUR KILL NEW YORK BEACH EROSION CONTROL STUDY	6505GR0001
NA - WAIKIKI BEACH OAHU HAWAII BEACH EROSION CONTROL STUDY	6503GR0003
NA - HALEIWA BEACH OAHU HAWAII BEACH EROSION CONTROL STUDY	6503GR0004
NA - WESTERLY RHODE ISLAND	6502GR0002
NA - DADE COUNTY FLORIDA	6806GR0001
NA - PINELLAS COUNTY FLORIDA	6610GR0001
NA - CITY OF EVANSTON ILLINOIS BEACH EROSION CONTROL STUDY	6505GR0003
NA - MULLEN KEY FLORIDA	6610GR0002
NA - BEACH EROSION CONTROL STUDY ST. JOHNS COUNTY FLORIDA	6607GR0001
NA - DUVAL COUNTY FLORIDA	6508GR0001
NA - BREVARD COUNTY FLORIDA	6807GR0001
NA - HUNTING ISLAND BEACH SOUTH CAROLINA	6407GR0001
NA - ATLANTIC COAST OF NEW YORK CITY FROM EAST ROCKAWAY INLET TO ROCKAWAY INLET AND JAMAICA BAY NEW YORK	6506GR0001
NA - NEW JERSEY COAST OF DELAWARE BAY FROM CAPE MAY CANAL TO MAURICE RIVER BEACH EROSION CONTROL STUDY	6106GR0001
NA - APPENDIX VI HUMBOLDT BAY (BUHNE POINT) CALIFORNIA BEACH EROSION CONTROL STUDY	5709GR0001
NA - WAIMEA BEACH AND HANAPEPE BAY ISLAND OF KAUAI T. H. BEACH EROSION CONTROL STUDY	5606GR0001

HOUSE DOCUMENT	(CONTINUED)		
6209GR0004	NA - BEACH EROSION CONTROL REPORT ON COOPERATIVE STUDY OF VIRGINIA AND BISCAYNE KEYS FLORIDA		
5705GR0004	NA - SANTA CRUZ COUNTY CALIFORNIA BEACH EROSION CONTROL STUDY		
6202GR0001	NA - BELLE PASS TO RACCOON POINT LOUISIANA BEACH EROSION CONTROL STUDY		
5705GR0003	NA - AREAS 8 AND 11 SAUGATUCK RIVER TO BYRAM RIVER CONNECTICUT BEACH EROSION CONTROL STUDY		
5704GR0001	NA - CHATHAM MASSACHUSETTS BEACH EROSION CONTROL STUDY		
5707GR0001	NA - DELAWARE COAST FROM KLITS HUMMOCK TO FENWICK ISLAND BEACH EROSION CONTROL STUDY		
6210SR0002	NA - SAN GABRIEL RIVER TO NEWPORT HAY ORANGE COUNTY CALIFORNIA APPENDIX V PHASE II BEACH EROSION CONTROL STUDY		
6106GR0002	NA - AMELIA ISLAND FLORIDA BEACH EROSION CONTROL STUDY		
6206GR0003	NA - RARITAN BAY AND SANDY HOOK BAY NEW JERSEY		
	NA - COAST OF SOUTHERN CALIFORNIA - SPECIAL INTERIM REPORT ON THE VENTURA AREA COOPERATIVE BEACH EROSION CONTROL STUDY		
6206SR0002	NA - PALM BEACH COUNTY FROM LAKE WORTH INLET TO SOUTH LAKE WORTH INLET FLORIDA BEACH EROSION CONTROL STUDY		
5712GR0004	NA - MASSACHUSETT BEACH WEYMOUTH MASSACHUSETTS		
6002GR0001	NA - SAN DIEGO COUNTY CALIFORNIA APPENDIX IV PHASE 2 BEACH EROSION CONTROL STUDY		
6009GR0001	NA - VIRGINIA BEACH VIRGINIA COOPERATIVE BEACH EROSION CONTROL STUDY		
6204GR0005	NA - CAROLINA BEACH AND VICINITY NORTH CAROLINA		
6205GR0002	NA - PALM BEACH COUNTY FLORIDA FROM MARTIN COUNTY LINE TO LAKE WORTH INLET AND FROM SOUTH LAKE WORTH INLET TO BR OWARD COUNTY LINE BEACH EROSION CONTROL STUDY		
6105GR0002	NA - SOUTH KINGSTON AND WESTERLY RHODE ISLAND BEACH EROSION CONTROL STUDY		
5809GR0001	NA - SHORE OF NEW JERSEY FROM SANDY HOOK TO BARNEGAT INLET BEACH EROSION CONTROL STUDY		
5603GR0001	NA - SHORE BETWEEN PEMBERTON POINT AND CAPE COD MASSACHUSETTS BEACH EROSION CONTROL STUDY		
5910GR0001	NA - SHORE OF SHEFFIELD LAKE COMMUNITY PARK OHIO BEACH EROSION CONTROL STUDY		
6205GR0001	NA - BERRIEN COUNTY MICHIGAN BEACH EROSION CONTROL STUDY		
5802SR0001	NA - SHORE OF NEW JERSEY FROM SANDY HOOK TO BARNEGAT INLET BEACH EROSION CONTROL STUDY		
5802SR0002	NA - OCEANVIEW OCEAN BEACH IMPERIAL BEACH AND CORONADO SAN DIEGO COUNTY CALIFORNIA BEACH EROSION CONTROL STUDY		
5605GR0001	NA - THAMES RIVER TO NANTIC BAY CONNECTICUT BEACH EROSION CONTROL STUDY		
5801GR0001	NA - SHORE OF THE STATE OF NEW HAMPSHIRE BEACH EROSION CONTROL STUDY		
6205GR0003	NA - CLARK POINT NEW BEDFORD MASSACHUSETTS BEACH EROSION CONTROL STUDY		
6209GR0002	NA - FORT MACON - ATLANTIC BEACH AND VICINITY NORTH CAROLINA		
6101GR0002	NA - LAKE ERIE SHORE LINE FROM THE MICHIGAN - OHIO STATE LINE TO MARBLEHEAD OHIO BEACH EROSION CONTROL STUDY		
6209GR0001	NA - SAN JUAN PUERTO RICO BEACH EROSION CONTROL STUDY		
5605GR0003	NA - FIRE ISLAND INLET TO JONES INLET LONG ISLAND NEW YORK COOPERATIVE BEACH EROSION CONTROL STUDY		
5605GR0002	NA - AREA 9 EAST RIVER TO NEW HAVEN HARBOR CONNECTICUT BEACH EROSION CONTROL STUDY		
5908GR0001	NA - SHORE OF NEW JERSEY - BARNEGAT INLET TO CAPE MAY CANAL BEACH EROSION CONTROL STUDY		
5308GR0004	NA - PRESQUE ISLE PENINSULA ERIE PENNSYLVANIA BEACH EROSION CONTROL STUDY		
5302GR0001	NA - RACINE COUNTY WISCONSIN BEACH EROSION CONTROL STUDY		
5402GR0002	NA - HAMPTON BEACH NEW HAMPSHIRE BEACH EROSION CONTROL STUDY		
5403GR0002	NA - SELKIRK SHORES STATE PARK NEW YORK BEACH EROSION CONTROL STUDY		
5403GR0001	NA - ANAHEIM BAY HARBOR CALIFORNIA		
5210SR0006	NA - ILLINOIS SHORE OF LAKE MICHIGAN BEACH EROSION CONTROL STUDY		
5206SR0001	NA - AREA 4 - CONNECTICUT RIVER TO HAMMONSETT RIVER CONNECTICUT BEACH EROSION CONTROL STUDY		
5306GR0002	NA - AREA 3 - NEW HAVEN HARBOR TO HOUSATONIC RIVER CONNECTICUT BEACH EROSION CONTROL STUDY		
5306GR0004	NA - VIRGINIA BEACH VIRGINIA BEACH EROSION CONTROL STUDY		
5310GR0004	NA - AREA 7 - HOUSATONIC RIVER TO ASH CREEK CONNECTICUT BEACH EROSION CONTROL STUDY		
5210GR0007	NA - APPENDIX I COAST OF CALIFORNIA CARPENTERIA TO POINT MUGO BEACH EROSION CONTROL STUDY		
5504GR0006	NA - HAMLIN BEACH STATE PARK NEW YORK BEACH EROSION CONTROL STUDY		
5504GR0005	NA - FAIR HAVEN BEACH STATE PARK NEW YORK BEACH EROSION CONTROL STUDY		
5404GR0001	NA - PINELLAS COUNTY FLORIDA BEACH EROSION CONTROL STUDY		
	NA - APPENDIX VIII OHIO SHORE LINE OF LAKE ERIE BETWEEN VERMILLION AND SHEFFIELD LAKE VILLAGE BEACH EROSION CONTROL STUDY		
5308GR0003	NA - APPENDICES V AND X OHIO SHORE LINE OF LAKE ERIE BETWEEN ASHTABULA AND THE PENNSYLVANIA STATE LINE BEACH EROSION CONTROL STUDY		
5201GR0003	NA - APPENDIX XI OHIO SHORE LINE OF LAKE ERIE EUCLID TO CHAGRIN RIVER BEACH EROSION CONTROL STUDY		
5402GR0001	NA - GULF SHORE OF GALVESTON ISLAND TEXAS BEACH EROSION CONTROL STUDY		
5307GR0002	NA - APPENDICES III VII AND XII OHIO SHORE LINE OF LAKE ERIE BETWEEN FAIRPORT AND ASHTABULA BEACH EROSION CONTROL STUDY		
5201GR0002	NA - APPENDIX III VII AND XII OHIO SHORE LINE OF LAKE ERIE BETWEEN FAIRPORT AND ASHTABULA BEACH EROSION CONTROL STUDY		

HOUSE DOCUMENT	(CONTINUED)	5306GR0002
NA - PLUM ISLAND MASSACHUSETTS BEACH EROSION CONTROL STUDY		5005GR0001
NA - APPENDIX IX - SHORE OF LAKE ERIE IN LAKE COUNTY OHIO BEACH EROSION CONTROL STUDY		5302GR0002
NA - AREA 6 - NIANTIC BAY TO CONNECTICUT RIVER CONNECTICUT BEACH EROSION CONTROL STUDY		4909GR0001
NA - PHEONIE BEACH VIRGINIA BEACH EROSION CONTROL STUDY		5005GR0002
NA - RESQUE ISLE PENNSYLVANIA BEACH EROSION CONTROL STUDY		5307GR0001
NA - COLD SPRING INLET (CAPE MAY HARBOR) NEW JERSEY		5308GR0001
NA - MAIKITI BEACH ISLAND OF OAHU I. H. BEACH EROSION CONTROL STUDY		5311GR0002
NA - APPENDIX II COAST OF CALIFORNIA POINT AUGU TO SAN PEDRO BREAKWATER BEACH EROSION CONTROL STUDY		5304GR0002
NA - APPENDIX IV OHIO SHORE LINE OF LAKE ERIE SANDUSKY BAY OHIO BEACH EROSION CONTROL STUDY		5105GR0003
NA - REVERE BEACH MASSACHUSETTS BEACH EROSION CONTROL STUDY		5509GR0002
NA - CITY OF KENOSHA WISCONSIN BEACH EROSION CONTROL STUDY		5504GR0004
NA - GRAND ISLE LOUISIANA BEACH EROSION CONTROL STUDY		5306GR0003
NA - OCEAN CITY NEW JERSEY BEACH EROSION CONTROL STUDY		5212GR0001
NA - AREA 5 PAMCATUCK RIVER TO THAMES RIVER CONNECTICUT BEACH EROSION CONTROL STUDY		5105GR0002
NA - QUINCY SHORE BEACH MASSACHUSETTS BEACH EROSION CONTROL STUDY		5002GR0001
NA - AREA 2 - HAMMONSETT RIVER TO EAST RIVER CONNECTICUT BEACH EROSION CONTROL STUDY		5105GR0001
NA - REVERE BEACH MASSACHUSETTS BEACH EROSION CONTROL STUDY		5002GR0002
NA - SOUTH SHORE STATE OF RHODE ISLAND BEACH EROSION CONTROL STUDY		5212GR0002
NA - APPENDIX IV OHIO SHORE LINE OF LAKE ERIE SANDUSKY TO VERMILLION OHIO BEACH EROSION CONTROL STUDY		5001GR0001
NA - AREA 1 - ASH CREEK TO SAUGATUCK RIVER CONNECTICUT BEACH EROSION CONTROL STUDY		5304GR0003
NA - APPENDIX XIV OHIO SHORE LINE OF LAKE ERIE SHEFFIELD LAKE VILLAGE TO ROCKY RIVER BEACH EROSION CONTROL STUDY		5003GR0001
NA - ATLANTIC CITY NEW JERSEY BEACH EROSION CONTROL STUDY		5003GR0002
NA - CLEVELAND AND LAKEWOOD OHIO BEACH EROSION CONTROL STUDY		5602GR0002
NA - MANITOWOC COUNTY FROM TWO RIVERS TO MANITOWOC WISCONSIN BEACH EROSION CONTROL STUDY		4812GR0005
NA - SANTA BARBARA CALIFORNIA BEACH EROSION CONTROL STUDY		4202GR0001
NA - BEACH EROSION STUDY CORONADO CALIFORNIA		4812GR0007
NA - JUPITER ISLAND FLORIDA BEACH EROSION STUDY		4308GR0001
NA - NIAGARA COUNTY NEW YORK BEACH EROSION STUDY		4604GR0002
NA - BEACH EROSION STUDY OF BAKERS HAULOVER INLET FLORIDA		4505GR0001
NA - BEACH EROSION STUDY LAKE ERIE SHORE LINE IN THE VICINITY OF HURON OHIO		3801GR0003
NA - BEACH EROSION AT WILLOUGHBY SPIT VIRGINIA		3803GR0001
NA - BEACH EROSION STUDY LAKE MICHIGAN SHORE LINE OF MILWAUKEE COUNTY WISCONSIN		4604GR0002
NA - BEACH EROSION STUDY OHIO SHORE LINE OF LAKE ERIE FROM OHIO - MICHIGAN STATE LINE TO MARBLEHEAD OHIO		4505GR0002
NA - WINTHROP BEACH MASSACHUSETTS BEACH EROSION CONTROL STUDY		4812GR0003
NA - PUNTA LAS MARIAS SAN JUAN P. R. BEACH EROSION CONTROL STUDY		3711GR0002
NA - STUDY OF AN ARTIFICIAL BATHING BEACH AT ORCHARD BEACH PELHAM BAY NEW YORK		4002GR0001
NA - BEACH EROSION STUDY ORANGE COUNTY CALIFORNIA		4805GR0001
NA - HARRISON COUNTY MISSISSIPPI BEACH EROSION CONTROL STUDY		4010GR0002
NA - BEACH EROSION STUDY ST SIMON ISLAND GEORGIA		4812GR0004
NA - NORTH CAROLINA SHORE LINE BEACH EROSION STUDY		4812GR0005
NA - ANNA MARIA AND LONGBOAT KEYS FLORIDA BEACH EROSION STUDY		3201GR0001
NA - PALM BEACH FLORIDA BEACH EROSION STUDY		3701GR0001
NA - FORT FISHER NORTH CAROLINA		3705GR0001
NA - BEACH EROSION AT MANASQUAN INLET NEW JERSEY AND ADJACENT BEACHES		3506GR0001
NA - BEACH EROSION AT HOLLYWOOD BEACH FLORIDA		3504GR0001
NA - BEACH EROSION AT COMPO BEACH WESTPORT CONNECTICUT		3401GR0001
NA - BEACH EROSION AT FOLLY BEACH SOUTH CAROLINA		3406GR0001
NA - WRIGHTSVILLE BEACH NORTH CAROLINA		3601GR0002
NA - BEACH EROSION AT GACVESTON TEXAS		
NA - BEACH EROSION AT JACOB HILLS PARK LONG ISLAND NEW YORK		
IMPERMEABLE		
NEW COASTAL WORKS AT NAHARIYA (ISRAEL)		
DUBAI CREEK ENTRANCE		
VARIATIONS IN GROIN DESIGN		

IMPERMEABLE	6010GR0001
DESIGN AND CONSTRUCTION OF THE SEAL BEACH GROIN	6204GR0001
ASPHALT GROINS	5712GR0003
THE ORIGIN AND STABILITY OF BEACHES	5904GR0001
UNFINISHED BUSINESS NEW JERSEY GROIN PROJECT STALLED BY WINTER	5810GR0002
SUMMARY STATEMENT CONCERNING IMPORTANCE OF A GROIN DESIGN CRITERION	5712GR0002
SOME COASTAL ENGINEERING PROBLEMS IN INDIA	6204GR0004
COAST PROTECTION - GROUPE SYSTEMS	5705GR0001
THE NEARSHORE MOVEMENT OF SAND AT DURBIN	6205GR0001
PHOTOGRAPHS OF COMPO BEACH WESTPORT CONNECTICUT AFTER GROIN CONSTRUCTION AND BEFORE FILL PLACEMENT	6307GR0003
A MODEL STUDY OF THE BEHAVIOR OF BEACHES AND GROYNES	6105GR0001
STRUCTURES FOR SHORE PROTECTION	5705GR0001
GROINS ON THE SHORE OF THE GREAT LAKES	6204GR0002
PHOTOGRAPHS OF SASCO HILL BEACH FAIRFIELD CONNECTICUT AFTER GROIN CONSTRUCTION AND BEFORE FILL PLACEMENT	6111GR0001
USE OF CONCRETE FOR SHORE PROTECTION	5700GR0002
GROINS ON THE SHORES OF THE GREAT LAKES	6004GR0001
FUNCTIONS OF GROINS FUNDAMENTAL STUDY ON BEACH SEDIMENT AFFECTED BY GROINS (1)	5903GR0002
A CONTRACTOR RATTLES THE TIDES	6000GR0001
COASTAL ENGINEERING STUDY AT POMPAHO BEACH	5900GR0004
COAST EROSION AND DEFENCE	6211GR0001
RECEDING OF SHORELINE AT COCHIN BY GROYNES AND A SEAWALL	6310GR0001
REVIEW OF BEACH EROSION AND STORM TIDE CONDITIONS IN FLORIDA 1961-1962	5712GR0001
COASTAL PROTECTION FOR FLORIDA	5708GR0001
FLORIDA COASTAL PROBLEMS	5409GR0001
ASPHALT GROINS - TWO YEAR PLAN	5204GR0001
FUNDAMENTALS OF COAST EROSION AND DEFENCE	5602GR0001
BITUMEN IN COASTAL ENGINEERING	5201GR0001
EROSION PROBLEMS ON THE OHIO SHORE OF LAKE ERIE	5406GR0001
BEHAVIOR OF BEACH FILL AT OCEAN CITY NEW JERSEY	5309GR0001
SUMMARY REPORT ON STUDIES OF SAND TRANSPORTATION BY WAVE ACTION	5400GR0001
COAST EROSION AND THE DEVELOPMENT OF BEACH PROFILES	5109GR0001
EXPERIMENTAL GROINS CAMP PERRY OHIO	5310GR0001
PHOTOGRAPHS OF FORT MACON NEAR MOREHEAD CITY NORTH CAROLINA AFTER SERIES OF HURRICANES IN 1954	5204GR0002
BEACH PROTECTION ENGINEERS ATTEMPT TO OUTWIT NATURE AT PRESQUE ISLE PENINSULA	5604GR0001
LOW COST SHORE PROTECTION USED ON THE GREAT LAKES	5200GR0002
CONCRETE BLOCKS FORM LOW-COST GROINS	5510GR0001
BEACH EROSION CONTROL GRAND ISLE LOUISIANA	5310GR0001
COAST EROSION AND PROTECTION - STUDIES IN CAUSES AND REMEDIES	5300GR0001
MARYLANDS FAVORITE BEACH AT OCEAN CITY	5306GR0001
COASTAL PROTECTION REVIEW OF METHODS FOR DEFENCE	5308GR0001
LAKE MICHIGAN EROSION STUDIES	5008GR0001
PRINCIPLES OF SHORE PROTECTION FOR THE GREAT LAKES	5009GR0001
PRECAST CONCRETE BLOCK GROINS	5210GR0003
THE DANISH WESTCOAST - LITTORAL DRIFT PROBLEMS AND MEASURES AGAINST COAST EROSION	5511GR0002
SCATTERED GROINS	5504GR0002
CASE HISTORY OF SHORE PROTECTION AT PRESQUE ISLE PENINSULA PENNSYLVANIA	5101GR0001
ASPHALT GROINS AND JETTIES	5607GR0001
THE FERNANDINA BEACH GROINS	5509GR0001
APPLICATION OF ASPHALT IN HYDRAULIC ENGINEERING WORKS	5500GR0001
INTERIM REPORT ON ASPHALT GROINS AT OCEAN CITY MARYLAND	5310GR0003
HOW TO BUILD A BEACH AT ECONOMY PRICES	5504GR0002
CONCRETE SHORE PROTECTION	5509GR0001
FILLING PATTERN OF THE FORT SHERIDAN GROIN SYSTEM	5504GR0001
THE ASPHALT GROINS AT OCEAN CITY MARYLAND	5504GR0003
PROBLEMS DE DEFENSE DES COTES RESUSCITE DE ECHECS DE QUELQUES OUVRAGES	5409GR0003
COASTAL DEVELOPMENT AND COASTAL PROTECTION	5511GR0001
MEASURES AGAINST EROSION AT GROINS AND JETTIES	5210GR0001

IMPERWEABLE (CONTINUED)

REPORT TO THE 18TH INTERNATIONAL NAVIGATION CONGRESS
CURVED GROINS AND FORESHORE DEFENCE
INFLUENCE OF GROINS ON BEACH STABILIZATION
SOME ASPECTS OF SHORE PROTECTION IN HUSTON HARBOR
COAST PROTECTION SOME RECENT WORKS ON THE EAST COAST 1942-52
COAST EROSION
DESIGN AND CONSTRUCTION OF GROINS
DIVISION OF SHORE EROSION - OHIO
EFFECTIVENESS OF PERMEABLE TYPE GROINS USED FOR BEACH PROTECTION AT SHOREWOOD WISCONSIN AND OTHER CITIES ALONG T
THE WEST SHORE OF LAKE MICHIGAN
REPORT TO THE 17TH INTERNATIONAL NAVIGATION CONGRESS
COAST PROTECTION
THE RELATION OF THE ACTION OF WAVES AND CURRENTS ON HEADLANDS TO THE CONTROL OF SHORE EROSION BY GROINS
THE PREVENTION OF COAST EROSION
BEACH EROSION STUDIES
SHORE EROSION AND CABBAGE PALMETTO GROINS AT NORTH POINT ST. AUGUSTINE FLORIDA
WAVE ACTION ON BEACHES
REPORT ON SHORE EROSION AT TILGHMAN POINT MARYLAND
REPORT ON ST. SIMON ISLAND STUDIES
BEACH PROTECTION MEASURES
EROSION CONTROL AT WRIGHTSVILLE BEACH
BEACH EROSION STUDIES
PROTECTING GALVESTON BEACH
DETERIORATION OF STEEL SHEET PILE GROINS AT PALM BEACH FLORIDA
RECENT STORM DAMAGE ALONG THE COASTS OF FLORIDA AND MISSISSIPPI
STEEL SHEET PILING FOR SHORE AND BEACH PROTECTION STRUCTURES
BEACH PROTECTION MEASURES
COAST EROSION IN GREAT BRITAIN
EFFECTIVENESS OF GROINS AT ROCKAWAY BEACH LONG ISLAND NEW YORK
EXPERIMENTAL STEEL SHEET PILE GROINS PALM BEACH FLORIDA
GALVESTON ISLAND SHORELINE AND THE PROTECTION OF GALVESTON BEACH
SHORE PROTECTIVE WORK AT WINTHROP MASSACHUSETTS
EROSION OF OUR COASTAL FRONTIERS
BEACH EROSION STUDIES
PAPER ON PROTECTIVE WORKS ADAPTED TO LIMIT EROSION ALONG THE OPEN COAST HOW THEY WORK
ALL STEEL GROynes - MIAMI BEACH
THE ACTION OF GROINS ON BEACH STABILIZATION
PERMEABLE GROINS AT KENOSHA WISCONSIN
SOME SEA DEFENCE WORKS FOR RECLAIMED LANDS
REPORT TO THE 17TH INTERNATIONAL NAVIGATION CONGRESS
SHORE PROTECTIVE WORK AT WINTHROP MASSACHUSETTS
THE PROBLEM OF COAST EROSION
REPORT TO THE 17TH INTERNATIONAL NAVIGATION CONGRESS
EROSION OF OUR COASTAL FRONTIERS - PART II
HAWKS NEST BEACH CONNECTICUT
EROSION AND PALMETTO GROINS AT NORTH POINT ST. AUGUSTINE FLORIDA
COAST EROSION
DIE SCHUTZBAUTEN AUF DER INSEL JORKUM
REPORT OF THE FORESHORE EROSION BOARD
CONSTRUCTION AND MAINTENANCE OF THE PUBLIC BEACH AT ROCKAWAY BEACH BOROUGH OF QUEENS
THE COASTAL DYNAMICS OF SAND WAVES AND THE INFLUENCE OF BREAKWATERS AND GROYNES
GROYNES
DU-PLAT-TAYLOR ADJUSTABLE SCREW PILE GROYNES
ART OF FORMING PROTECTIVE BEACHES
COAST PROTECTION ON THE NORTH SEA COASTS OF HOLLAND FRANCE BELGIUM AND GERMANY
CALIFORNIA BEACH EROSION AND DEVELOPMENT PROBLEMS

IMPERMEABLE

(CONTINUED)

COAST EROSION AND PROTECTION ON LONG ISLAND AND NEW JERSEY
THE PROTECTION AND IMPROVEMENT OF FORESHORES BY THE UTILIZATION OF TIDAL AND WAVE ACTION
REPORT ON BEACH EROSION AT HOLLYWOOD BEACH FLORIDA
THE NORTH SHORE VERSUS LAKE MICHIGAN
DETAIL OF CONCRETE PILE USED IN GROINS CONSTRUCTED AT MONTECITO CALIFORNIA
TEST WITH SCALE MODELS TO DETERMINE THE EFFECT OF CURRENTS AND BREAKERS UPON A SANDY BEACH AND THE ADVANTAGEOUS

INSTALLATION OF GROINS

ROUND-TABLE DISCUSSION OF SHORE PROBLEMS IN RELATION TO RECREATION
SEA DEFENCE EROSION AND PROTECTION ON A SANDY COAST
CONEY ISLAND PUBLIC BEACH AND BOARDWALK IMPROVEMENT
PROTECTION OF COASTS AGAINST THE SEA WITH OR WITHOUT PREPONDERATING COASTAL DRIFT OF MATERIALS
SEA WALLS AND GROINS OF STEEL SHEETING STABILIZE MIAMI BEACH
REPORT ON EROSION AT MANASQUAN INLET NEW JERSEY AND ADJACENT BEACHES
REPORT TO THE 15TH INTERNATIONAL NAVIGATION CONGRESS
REPORT TO THE 15TH INTERNATIONAL NAVIGATION CONGRESS
INVESTIGATIONS OF STEEL SHEET PILING

LEGAL

COASTAL PROTECTION PROCEDURES WITH SPECIAL REFERENCE TO CONDITIONS IN FLORIDA
GROINS AND EFFECTS - MINIMIZING LIABILITIES
ALL STEEL GROINE - MIAMI BEACH
THE PREVENTION OF COAST EROSION

LONG

VARIATIONS IN GROIN DESIGN
GROINS FROM WISCONSIN ON LAKE MICHIGAN
EXPERIMENT IN SHORE PROTECTION
PERMEABLE GROINS FROM ILLINOIS ON LAKE MICHIGAN
EXPERIMENTAL STUDY OF THE HYDRAULIC BEHAVIOR OF GROINE SYSTEMS
A PICTORIAL HISTORY OF SELECTED STRUCTURES ALONG THE NEW JERSEY COAST
PERMEABLE AND SEMIPERMEABLE GROINS FROM OHIO ON LAKE ERIE
CHARACTERISTICS OF SHINGLE BEACHES: THE SOLUTION TO SOME PRACTICAL PROBLEMS
VARIATIONS IN GROIN DESIGN
USE OF LONG GROINS AS ARTIFICIAL HEADLANDS
STABILITY OF BEACHES USING GROINS
A STUDY OF GROINS AND THEIR FUNCTION AS HYDRAULIC STRUCTURES
SUMMARY STATEMENT CONCERNING IMPORTANCE OF A GROIN DESIGN CRITERION
PHOTOGRAPHS OF SASCO HILL BEACH FAIRFIELD CONNECTICUT AFTER GROIN CONSTRUCTION AND BEFORE FILL PLACEMENT
FUNCTIONS OF GROINS FUNDAMENTAL STUDY ON BEACH SEDIMENT AFFECTED BY GROINS (1)
GROINS ON THE SHORES OF THE GREAT LAKES
A MODEL STUDY OF THE BEHAVIOR OF BEACHES AND GROYNES
THE ORIGIN AND STABILITY OF BEACHES
SOME COASTAL ENGINEERING PROBLEMS IN INDIA
COAST PROTECTION - GROINE SYSTEMS
BEHAVIOR OF BEACH FILL AND BORROW AREA AT PROSPECT BEACH WEST HAVEN CONNECTICUT
AERIAL PHOTOGRAPHS OF WALLIS SAND STATE BEACH RYE NEW HAMPSHIRE
PHOTOGRAPHS OF COMPO BEACH WESTPORT CONNECTICUT AFTER GROIN CONSTRUCTION AND BEFORE FILL PLACEMENT
COASTAL ENGINEERING STRUCTURES
SCALE EFFECTS IN MODELS WITH LITTORAL SAND DRIFT
ARRANGEMENT OF GROINS ON A SANDY BEACH
COAST EROSION AND PROTECTION - STUDIES IN CAUSES AND REMEDIES
FILLING PATTERN OF THE FORT SHERIDAN GROIN SYSTEM
PROBLEMS DE DEFENSE DES COTES NECESSITE DE ECHECS DE QUELQUES OUVRAGES
BEACH PROTECTION ENGINEERS ATTEMPT TO OUTWIT NATURE AT PRESQUE ISLE PENINSULA
LAKE MICHIGAN EROSION STUDIES
COAST PROTECTION SOME RECENT WORKS ON THE EAST COAST 1942-52
LITTORAL PROCESSES ON SANDY COASTS

BEACH EROSION CONTROL GRAND ISLE LOUISIANA
 SHOREWOOD PROTECTS ITS LAKE FRONT
 EFFECTIVENESS OF PERMEABLE TYPE GROINS USED FOR BEACH PROTECTION AT SHOREWOOD WISCONSIN AND OTHER CITIES ALONG T
 HE WEST SHORE OF LAKE MICHIGAN
 COAST EROSION IN GREAT BRITAIN
 BEACH PROTECTION MEASURES
 EROSION OF OUR COASTAL FRONTIERS
 SHORE PROTECTION METHODS AND MATERIALS
 PERMEABLE GROINS AT KENOSHA WISCONSIN
 COAST EROSION
 COAST PROTECTION
 COAST EROSION
 REPORT TO THE 17TH INTERNATIONAL NAVIGATION CONGRESS
 REPORT TO THE 17TH INTERNATIONAL NAVIGATION CONGRESS
 PAPER ON PROTECTIVE WORKS ADAPTED TO LIMIT EROSION ALONG THE OPEN COAST HOW THEY WORK
 EROSION OF OUR COASTAL FRONTIERS - PART II
 THE PROBLEM OF COAST EROSION
 REPORT OF ADVISORY BOARD ON BEACH PROTECTION LOS ANGELES COUNTY
 SAND MOVEMENT AND BEACH EROSION
 CONEY ISLAND PUBLIC BEACH AND BOARDWALK IMPROVEMENT
 THE NORTH SHORE VERSUS LAKE MICHIGAN
 THE PROTECTION AND IMPROVEMENT OF FRESHWATERS BY THE UTILIZATION OF TIDAL AND WAVE ACTION
 ROUND-TABLE DISCUSSION OF SHORE PROBLEMS IN RELATION TO RECREATION
 COAST EROSION AND PROTECTION ON LONG ISLAND AND NEW JERSEY
 INVESTIGATIONS OF STEEL SHEET PILING
 GROYNES
 CERTAIN POINTS ABOUT EROSION COSTS AND MEASURES OF PROTECTION
 NEW COASTAL WORKS AT NABARIVA (ISRAEL)
 MARITIME AND RIPARIAN USE OF GABIONS
 GROINS FROM WISCONSIN ON LAKE MICHIGAN
 A PICTORIAL HISTORY OF SELECTED STRUCTURES ALONG THE NEW JERSEY COAST
 PERMEABLE AND SEMIPERMEABLE GROINS FROM OHIO ON LAKE ERIE
 COASTAL PROCESSES
 SHORE PROTECTION PLANNING AND DESIGN
 VARIATIONS IN GROIN DESIGN
 EXPERIMENT IN SHORE PROTECTION
 VARIATIONS IN GROIN DESIGN
 ASPHALT IN BEACH EROSION CONTROL STRUCTURES
 UNFINISHED BUSINESS NEW JERSEY GROIN PROJECT STALLED BY WINTER
 COAST EROSION AND DEFENCE
 GENERALITIES ON COASTAL PROCESSES AND PROTECTION
 COASTAL ENGINEERING STRUCTURES
 STABILIZATION OF SHINGLE ALLUVIAL SHORES BY GROINS OF FULL PROFILE
 BEHAVIOR OF BEACH FILL AND BORROW AREA AT PROSPECT BEACH WEST HAVEN CONNECTICUT
 AN EXPERIMENTAL STUDY ON THE EFFECT OF COASTAL GROINS
 PROTECTING OUR SHORE LINE
 COASTAL ENGINEERING STUDY AT POMPANO BEACH
 PHOTOGRAPHS OF COMPO BEACH WESTPORT CONNECTICUT AFTER GROIN CONSTRUCTION AND BEFORE FILL PLACEMENT
 BEHAVIOR OF SAND ASPHALT GROINS AT OCEAN CITY MARYLAND
 ASPHALT GROINS
 BASIC COASTAL MODEL
 OCEANOGRAPHICAL ENGINEERING
 REVIEW OF BEACH EROSION AND STORM TIDE CONDITIONS IN FLORIDA 1961-1962
 COAST PROTECTION - GROYNES SYSTEMS
 STRUCTURES FOR SHORE PROTECTION

(CONTINUED)

PHOTOGRAPHS OF SASSCO HULL BEACH FAIRFIELD CONNECTICUT AFTER GROIN CONSTRUCTION AND BEFORE FILL PLACEMENT

SUMMARY STATEMENT CONCERNING IMPORTANCE OF A GROIN DESIGN CRITERION

COASTAL PROTECTION FOR FLORIDA

A MODEL STUDY OF THE BEHAVIOR OF BEACHES AND GROYNES

ASPHALT GROINS - TWO YEAR PLAN

INFLUENCE OF GROINS ON BEACH STABILIZATION

INFORMATION ON BEACH PROTECTION IN FLORIDA

THE FERNANDINA BEACH GROINS

PRECAST CONCRETE BLOCK GROINS

BEACH PROTECTION ENGINEERS ATTEMPT TO OUTWIT NATURE AT PRESQUE ISLE PENINSULA

REPORT TO THE 18TH INTERNATIONAL NAVIGATION CONGRESS

THE ASPHALT GROINS AT OCEAN CITY MARYLAND

SOME ASPECTS OF SHORE PROTECTION IN BOSTON HARBOR

SCATTERED GROINS

COAST EROSION AND PROTECTION - STUDIES IN CAUSES AND REMEDIES

FUNDAMENTALS OF COAST EROSION AND DEFENCE

COAST PROTECTION SOME RECENT WORKS ON THE EAST COAST 1942-52

DESIGN AND CONSTRUCTION OF GROINS

CURVED GROINS AND FORESHORE DEFENCE

LAKE MICHIGAN EROSION STUDIES

MARYLANDS FAVORITE BEACH AT OCEAN CITY

FILLING PATTERN OF THE FORT SHERIDAN GROIN SYSTEM

HOW TO BUILD A BEACH AT ECONOMY PRICES

SHORE PROTECTIVE WORK AT WINTHROP MASSACHUSETTS

WINDS WAVES AND MARITIME STRUCTURES

EROSION AND PALMETTO GROINS AT NORTH POINT ST. AUGUSTINE FLORIDA

PAPER ON PROTECTIVE WORKS ADAPTED TO LIMIT EROSION ALONG THE OPEN COAST HOW THEY WORK

SHORE PROTECTION BY PERMEABLE GROINS

COAST EROSION

REPORT TO THE 17TH INTERNATIONAL NAVIGATION CONGRESS

BEACH PROTECTION MEASURES

REPORT TO THE 17TH INTERNATIONAL NAVIGATION CONGRESS

THE RELATION OF THE ACTION OF WAVES AND CURRENTS ON HEADLANDS TO THE CONTROL OF SHORE EROSION BY GROINS

SHORE PROTECTION METHODS AND MATERIALS

THE PREVENTION OF COAST EROSION

BEACH EROSION STUDIES

GALVESTON ISLAND SHORELINE AND THE PROTECTION OF GALVESTON BEACH

SOME SEA DEFENCE WORKS FOR RECLAIMED LANDS

THE PREVENTION OF COAST EROSION

WAVE ACTION ON BEACHES

BEACH PROTECTION MEASURES

THE PROBLEM OF COAST EROSION

ALL STEEL GROYNES - MIAMI BEACH

COAST EROSION

COAST PROTECTION

THE ACTION OF GROINS ON BEACH STABILIZATION

COAST EROSION IN GREAT BRITAIN

MESH JETTIES

EROSION OF OUR COASTAL FRONTIERS

GROYNES

REPORT OF THE FORESHORE EROSION BOARD

PARTICIPATION OF FEDERAL RELIEF AGENCIES IN BEACH PROTECTION PROJECTS

INVESTIGATIONS OF STEEL SHEET PILING

COAST EROSION AND PROTECTION ON LONG ISLAND AND NEW JERSEY

CALIFORNIA'S BEACH EROSION AND DEVELOPMENT PROBLEMS

THE PROTECTION AND IMPROVEMENT OF FORESHORES BY THE UTILIZATION OF TIDAL AND WAVE ACTION

COAST EROSION AND FORESHORE PROTECTION
CONSTRUCTION AND MAINTENANCE OF THE PUBLIC BEACH AT ROCKAWAY BEACH BOROUGH OF QUEENS
SHORE PROTECTIVE WORK AT WINTHROP MASSACHUSETTS
REPORT OF ADVISORY BOARD ON BEACH PROTECTION LOS ANGELES COUNTY
THE NORTH SHORE VERSUS LAKE MICHIGAN
SAND MOVEMENT AND BEACH EROSION
DU-PLAY-TAYLOR ADJUSTABLE SCREW PILE GROYNES
ROUND-TABLE DISCUSSION OF SHORE PROBLEMS IN RELATION TO RECREATION

L-GROINS

A STUDY OF GROINS AND THEIR FUNCTION AS HYDRAULIC STRUCTURES
MEASURES AGAINST EROSION AT GROINS AND JETTIES
COASTAL DEVELOPMENT AND COASTAL PROTECTION
COASTAL PROTECTION REVIEW OF METHODS FOR DEFENCE
BEACH PROTECTION MEASURES
BEACH PROTECTION MEASURES

MAINTENANCE

COASTAL PROTECTION PROCEDURES WITH SPECIAL REFERENCE TO CONDITIONS IN FLORIDA

EMERGENCY METHODS TO COMBAT BEACH EROSION
PERMEABLE GROINS FROM ILLINOIS ON LAKE MICHIGAN

A PICTORIAL HISTORY OF SELECTED STRUCTURES ALONG THE NEW JERSEY COAST

GROINS FROM WISCONSIN ON LAKE MICHIGAN

PERMEABLE AND SEMIPERMEABLE GROINS FROM OHIO ON LAKE ERIE

EFFECTS OF LARGE STRUCTURES ON THE OHIO SHORE OF LAKE ERIE

EMERGENCY MEASURES TO COMBAT BEACH EROSION

THE SELSEY COAST PROTECTION SCHEME

A CONTRACTOR BATTLES THE TIDES

DEVELOPMENT OF THE NEW JERSEY SHORE

COAST EROSION AND THE DEVELOPMENT OF BEACH PROFILES

COAST PROTECTION SOME RECENT WORKS ON THE EAST COAST 1942-52

BITUMEN IN COASTAL ENGINEERING

PAPER ON PROTECTIVE WORKS ADAPTED TO LIMIT EROSION ALONG THE OPEN COAST HOW THEY WORK

THE DANISH WESTCOAST - LITTORAL DRIFT PROBLEMS AND MEASURES AGAINST COAST EROSION

EFFECTIVENESS OF GROINS AT ROCKAWAY BEACH LONG ISLAND NEW YORK

THE PROBLEM OF COAST EROSION

THE PREVENTION OF COAST EROSION

REPORT TO THE 17TH INTERNATIONAL NAVIGATION CONGRESS

CONSTRUCTION AND MAINTENANCE OF THE PUBLIC BEACH AT ROCKAWAY BEACH BOROUGH OF QUEENS

DIE SCHUTZBAUTEN AUF DER INSEL BORKUM

MILLIKEN

CURVED JETTIES SEA WALLS BULKHEADS AND RETAINING WALLS

MISC-MATERIALS

VARIATIONS IN GROIN DESIGN

MARI TIME AND RIPARIAN USE OF GABIONS

VARIATIONS IN GROIN DESIGN

LAND RECLAMATION AND GROIN-BUILDING IN THE TIDAL FLATS

REPORT TO THE 21ST INTERNATIONAL NAVIGATION CONGRESS

EXPERIMENTAL GROINS CAMP PERRY OHIO

LES OUVRAGES DE DEFENCE CONTRE LA MER SUR LA COTE FRANCAISE DE LOCEAN ENTRE LA LOIRE ET LA GIRONDE

INFORMATION ON BEACH PROTECTION IN FLORIDA

FUNDAMENTALS OF COAST EROSION AND DEFENCE

BITUMEN IN COASTAL ENGINEERING

COAST EROSION AND PROTECTION - STUDIES IN CAUSES AND REMEDIES

THE PROBLEM OF COAST EROSION

MESH JETTIES

GROYNES

08005GR0001
36105GR0002
3806GR0001
3012GR0001
3011GR0001
3106GR0001
3306GR0001
3710GR0001
6107GR0001
5210GR0001
5511GR0001
5311GR0001
4210GR0001
4206GR0001
6412GR0001
6504GR0001
6506GR0002
6410GR0001
6500GR0001
6500GR0003
6400GR0002
6306GR0002
6112GR0001
6004GR0001
5210GR0005
5406GR0001
5306GR0001
5409GR0002
4806GR0001
5008GR0001
3812GR0001
4700GR0001
4104GR0001
4900GR0005
3610GR0002
3512GR0001
4001GR0002
6705GR0001
6512GR0001
6510GR0001
7009GR0004
6500GR0004
5309GR0001
5409GR0004
5210GR0008
5409GR0001
5409GR0002
5200GR0002
4204GR0001
4700GR0001
3602GR0001
3400GR0001

MISC-MATERIALS	(CONTINUED)	3703GR0001
MISC-PLAN	COAST PROTECTION ON THE NORTH SEA COASTS OF HOLLAND FRANCE BELGIUM AND GERMANY	6510GR0002
	USE OF LONG GROINS AS ARTIFICIAL HEADLANDS	6512GR0001
	MARITIME AND RIPARIAN USE OF GABIONS	6410GR0001
	A PICTORIAL HISTORY OF SELECTED STRUCTURES ALONG THE NEW JERSEY COAST	6502GR0001
	NEW COASTAL WORKS AT NABARIYA (ISRAEL)	6511GR0001
	STUDY OF EROSION ALONG HOMER SPIT AND VICINITY KACHEMAK BAY ALASKA	6510GR0004
	LITTORAL PROCESSES AND THE DEVELOPMENT OF SHORELINES	7009GR0003
	EXPERIMENTAL STUDY OF THE HYDRAULIC BEHAVIOR OF INCLINED GROINE SYSTEMS	6606GR0002
	SHORE PROTECTION PLANNING AND DESIGN	7011GR0001
	BEACH BEHAVIOR NORTH SHORE LONG ISLAND SOUND	6809GR0004
	THE CREATION OF AN ARTIFICIAL BEACH IN LARVOTTO BAY MONTE CARLO PRINCIPALITY OF MONACO	7009GR0006
	CHARACTERISTICS OF SHINGLE BEACHES: THE SOLUTION TO SOME PRACTICAL PROBLEMS	6809GR0006
	CLIFF DRAINAGE AND BEACH DISTRIBUTION	5712GR0002
	SOME COASTAL ENGINEERING PROBLEMS IN INDIA	6010GR0002
	COASTAL PROTECTION IN MASSACHUSETTS	6112GR0001
	THE SELSEY COAST PROTECTION SCHEME	5800GR0004
	BASIC COASTAL MODEL	6307GR0002
	REVIEW OF GERMAN EXPERIENCE ON COASTAL PROTECTION BY GROINS	6107GR0001
	A STUDY OF GROINS AND THEIR FUNCTION AS HYDRAULIC STRUCTURES	6400GR0003
	OCEANOGRAPHICAL ENGINEERING	6406GR0001
	STABILITY OF BEACHES USING GROINS	6310GR0001
	COASTAL PROTECTION FOR FLORIDA	6105GR0001
	GROINS ON THE SHORE OF THE GREAT LAKES	5812GR0001
	MOTION OF SAND PARTICLES BETWEEN GROINS	5803GR0001
	FEEDER BEACHES AND GROINS RESTORE PRESQUE ISLE PENINSULA	6005GR0001
	COAST EROSION AND DEFENCE	6204GR0003
	ASPHALT IN BEACH EROSION CONTROL STRUCTURES	6108GR0001
	BEHAVIOR OF BEACH FILL AND HORROW AREA AT PRUSPECT BEACH WEST HAVEN CONNECTICUT	6112GR0002
	BEACH EROSION AND PROTECTION WORKS IN IMAZU-SAKANO BEACH	6008GR0003
	SHORELINE ADVANCEMENT BY SEA WALL AND GROYNES AT COCHIN	5810GR0001
	AN EXPERIMENTAL STUDY ON THE EFFECT OF COASTAL GROINS	5905GR0001
	BEHAVIOR OF SAND ASPHALT GROINS AT OCEAN CITY MARYLAND	6210GR0001
	SHEET STEEL PILING FOR SHORE PROTECTION STRUCTURES	5201GR0001
	SUMMARY REPORT ON STUDIES OF SAND TRANSPORTATION BY WAVE ACTION	5311GR0001
	COASTAL PROTECTION REVIEW OF METHODS FOR DEFENCE	5607GR0002
	CURVED GROINS AND FRESHORE DEFENCE	5511GR0003
	THE LONGITUDINAL STABILITY OF BEACHES	5700GR0001
	IMPERMEABLE AND PERMEABLE GROINS	5511GR0001
	COASTAL DEVELOPMENT AND COASTAL PROTECTION	5609GR0001
	ARRANGEMENT OF GROINS ON A SANDY BEACH	5210GR0001
	MEASURES AGAINST EROSION AT GROINS AND JETTIES	5409GR0005
	OBSERVATIONS ON THE TRAVEL OF SHORE MATERIAL ALONG A CHALK FORESHORE	5609GR0002
	TIMBER IN THE CONSTRUCTION OF SEA DEFENCE AND RIVER WORKS	5200GR0002
	COAST EROSION AND PROTECTION - STUDIES IN CAUSES AND REMEDIES	5009GR0001
	SCATTERED GROINS	4300GR0001
	THE RELATION OF THE ACTION OF WAVES AND CURRENTS ON HEADLANDS TO THE CONTROL OF SHORE EROSION BY GROINS	4905GR0001
	REPORT TO THE 17TH INTERNATIONAL NAVIGATION CONGRESS	4001GR0003
	HAWKS NEST BEACH CONNECTICUT	3811GR0001
	SHORE EROSION AND CABBAGE PALMETTO GROINS AT NORTH POINT ST.AUGUSTINE FLORIDA	4904GR0001
	COAST PROTECTION	4000GR0002
	BEACH EROSION STUDIES	4204GR0001
	COAST EROSION IN GREAT BRITAIN	4410GR0001
	STEEL SHEET PILING FOR SHORE AND BEACH PROTECTION STRUCTURES	4000GR0003
	THE PREVENTION OF COAST EROSION	4700GR0001

SUMMARY REPORT ON STUDIES OF SAND TRANSPORTATION BY WAVE ACTION
 FUNCTIONS OF GROINS FUNDAMENTAL STUDY ON BEACH SEDIMENT AFFECTED BY GROINS (1)
 ARRANGEMENT OF GROINS ON A SANDY BEACH
 MEASURES AGAINST EROSION AT GROINS AND JETTIES
 INFLUENCE OF GROINS ON BEACH STABILIZATION
 WAVE ACTION ON BEACHES
 TEST WITH SCALE MODELS TO DETERMINE THE EFFECT OF CURRENTS AND BREAKERS UPON A SANDY BEACH AND THE ADVANTAGEOUS
 INSTALLATION OF GROINS

NOT ANNOTATED

NA - SEA DEFENCE WORKS - GROINS AND REVETMENTS
 NA - OCRACOE ISLAND, NORTH CAROLINA
 NA - MULLET KEY, FLORIDA
 NA - BEACH EROSION CONTROL STUDY ST. JOHNS COUNTY, FLORIDA
 NA - STATEN ISLAND FORT WADSWORTH TO ARTHUR KILL NEW YORK BEACH EROSION CONTROL STUDY
 NA - ATLANTIC COAST OF LONG ISLAND FIRE ISLAND INLET AND SHORE WESTERLY TO JONES INLET NEW YORK
 NA - MAIKIKI BEACH OAHU HAWAII BEACH EROSION CONTROL STUDY
 NA - HALEIHA BEACH OAHU HAWAII BEACH EROSION CONTROL STUDY
 NA - SPECIAL STUDY OF CITY OF SAN DIEGO (SUNSET CLIFFS) CALIFORNIA
 NA - DUVAL COUNTY, FLORIDA
 NA - BREVARD COUNTY, FLORIDA
 NA - REPORT TO THE 22ND INTERNATIONAL NAVIGATION CONGRESS
 NA - ATLANTIC COAST OF NEW YORK CITY FROM EAST ROCKAWAY INLET TO ROCKAWAY INLET AND JAMAICA BAY NEW YORK
 NA - BEACH EROSION AND COASTAL DEVELOPMENT IN THE CANTERBURY BIGHT
 NA - CITY OF EVANSTON, ILLINOIS BEACH EROSION CONTROL STUDY
 NA - PINELLAS COUNTY, FLORIDA
 NA - PERTH ARBOUR NEW JERSEY BEACH EROSION CONTROL STUDY
 NA - DADE COUNTY, FLORIDA
 NA - WESTERLY RHODE ISLAND
 NA - SAN JUAN PUERTO RICO BEACH EROSION CONTROL STUDY
 NA - SEA DEFENCE GROYNES - 4
 NA - SHORE OF THE STATE OF NEW HAMPSHIRE BEACH EROSION CONTROL STUDY
 NA - ATLANTIC CITY NEW JERSEY BEACH EROSION CONTROL STUDY
 NA - PROTECTION DES COTES CONTRE L'EROSION MARITIME ET FORMATION DES PLAGES DE SABLE
 NA - FALMOUTH MASSACHUSETTS
 NA - CAROLINA BEACH AND VICINITY NORTH CAROLINA
 NA - FORT MACON - ATLANTIC BEACH AND VICINITY NORTH CAROLINA
 NA - LAKE ERIE SHORE LINE FROM THE MICHIGAN - OHIO STATE LINE TO MARHLEHEAD OHIO BEACH EROSION CONTROL STUDY
 NA - PROTECCAO DA COSTA CONTRA A EROSAO MARITIMA E FORMACAO DE PRAIAS DE ARCIA - DOIS PROBLEMAS NA COSTA DE
 MOCAMBIQUE
 NA - CLARK POINT NEW BEDFORD MASSACHUSETTS BEACH EROSION CONTROL STUDY
 NA - SHORE BETWEEN PEMBERTON POINT AND CAPE COD MASSACHUSETTS BEACH EROSION CONTROL STUDY
 NA - SHORE OF SHEFFIELD LAKE COMMUNITY PARK OHIO BEACH EROSION CONTROL STUDY
 NA - SHORE OF NEW JERSEY - BARNEGAT INLET TO CAPE MAY CANAL BEACH EROSION CONTROL STUDY
 NA - A SCIENTIFIC BASIS FOR DESIGN OF GROUNE SYSTEMS
 NA - UBER DEN EINFLUSS VON STRANDBUHNEN AUF DIE SANDWANDERUNG AN FLACHKUSTEN
 NA - COAST OF SOUTHERN CALIFORNIA - SPECIAL INTERIM REPORT ON THE VENTURA AREA COOPERATIVE BEACH EROSION
 CONTROL STUDY
 NA - RARITAN BAY AND SANDY HOOK BAY NEW JERSEY
 NA - SAN GABRIEL RIVER TO NEWPORT BAY ORANGE COUNTY CALIFORNIA APPENDIX V PHASE II BEACH EROSION CONTROL STUDY
 NA - NEW JERSEY COAST OF DELAWARE BAY FROM CAPE MAY CANAL TO MAURICE RIVER BEACH EROSION CONTROL STUDY
 NA - ANELTA ISLAND FLORIDA BEACH EROSION CONTROL STUDY
 NA - COAST PROTECTION - GROYNES
 NA - WESSAGUSSETT BEACH WETMOUTH MASSACHUSETTS
 NA - SAN DIEGO COUNTY CALIFORNIA APPENDIX IV PHASE 2 BEACH EROSION CONTROL STUDY
 NA - AN INVESTIGATION INTO THE EFFECTIVENESS OF VARIOUS TYPES OF GROYNES ON SEAFORD BEACH
 NA - GROINS WITH ASPHALT GROUT IN EAST FRIESIAN COAST REGION

- NA - MODEL INVESTIGATIONS OF HARBOR INLET SILTING
- NA - BELLE PASS TO RACCOON POINT LOUISIANA BEACH EROSION CONTROL STUDY
- NA - VIRGINIA BEACH VIRGINIA COUPEATIVE BEACH EROSION CONTROL STUDY
- NA - SEA DEFENCE GROUNES
- NA - GROUNES AS BARRIERS TO MOVEMENT OF BEACH MATERIAL
- NA - HUNTING ISLAND BEACH SOUTH CAROLINA
- NA - BEACH EROSION CONTROL REPORT ON COOPERATIVE STUDY OF VIRGINIA AND HISCAYNE KEYS FLORIDA
- NA - CULTIVATED LAND CONSERVATION AND RECLAMATION
- NA - PROTECTION OF THE WEST BEACH OF SYLT ISLAND BY FLAT GROINS
- NA - PALM BEACH COUNTY FLORIDA FROM MARTIN COUNTY LINE TO LAKE WORTH INLET AND FROM SOUTH LAKE WORTH INLET TO BK OAKARD COUNTY LINE BEACH EROSION CONTROL STUDY
- NA - APPENDIX XI OHIO SHORE LINE OF LAKE ERIE EUCLID TO CHAGRIN RIVER BEACH EROSION CONTROL STUDY
- NA - PROVISIONS FOR STABILIZATION AND MAINTENANCE OF FLOATING ISLANDS OF THE SOUTH COAST OF GERMAN NORTH SEA
- NA - DIE NORDOSTLICHE HEIDE HECKLENBURGS
- NA - APPENDICES V AND X OHIO SHORE LINE OF LAKE ERIE BETWEEN ASHTABULA AND THE PENNSYLVANIA STATE LINE BEACH EROSION CONTROL STUDY
- NA - APPENDICES III VII AND XII OHIO SHORE LINE OF LAKE ERIE BETWEEN FAIRPORT AND ASHTABULA BEACH EROSION CONTROL STUDY
- NA - COLD SPRING INLET (CAPE MAY HARBOR) NEW JERSEY
- NA - AREAS H AND LI SAUGATUCK RIVER TO BYRAM RIVER CONNECTICUT BEACH EROSION CONTROL STUDY
- NA - CHATHAM MASSACHUSETTS BEACH EROSION CONTROL STUDY
- NA - SANTA CRUZ COUNTY CALIFORNIA BEACH EROSION CONTROL STUDY
- NA - CONSTRUCTION OF A HEAVY DUNE COVER BY ASPHALT-HASALT METHOD ON THE ISLAND OF BORKUM
- NA - DELAWARE COAST FROM KITTS HUMMOCK TO FENWICK ISLAND BEACH EROSION CONTROL STUDY
- NA - GENERAL COASTAL DYNAMICS AND COASTAL PROTECTION OF THE SOUTH BALTIC SEA BETWEEN TRAVE AND SWINE
- NA - GULF SHORE OF GALVESTON ISLAND TEXAS BEACH EROSION CONTROL STUDY
- NA - WAIKIKI BEACH ISLAND OF OAHU T. H. BEACH EROSION CONTROL STUDY
- NA - AREA 6 - NIANTIC BAY TO CONNECTICUT RIVER CONNECTICUT BEACH EROSION CONTROL STUDY
- NA - BRANDUNGSUNTERSUCHUNGEN AN DEN KUSTEN VON FERNHARN UND NORDWAGRIEN
- NA - MODEL TESTS OF WAVE RUN-UP ON SEA DYKES IN WATT REGION
- NA - EFFECTS OF COASTAL PROTECTIVE STRUCTURES ON SYLT
- NA - AIMECA BEACH AND MANAPEPE BAY ISLAND OF KAUAI T. H. BEACH EROSION CONTROL STUDY
- NA - ON THE FLOW CHARACTERISTICS IN THE VICINITY OF GROINS
- NA - ON THE EFFECTS OF GROINS
- NA - RACINE COUNTY WISCONSIN BEACH EROSION CONTROL STUDY
- NA - APPENDIX VI HUMBOLDT BAY (BUHNE POINT) CALIFORNIA BEACH EROSION CONTROL STUDY
- NA - ON THE ALIGNMENT OF COASTAL GROINS
- NA - APPENDIX I COAST OF CALIFORNIA CARPENTERIA TO POINT HUGO BEACH EROSION CONTROL STUDY
- NA - PRESQUE ISLE PENINSULA ERIE PENNSYLVANIA BEACH EROSION CONTROL STUDY
- NA - SURGE AND SHORE CHANGES ON THE WEST COAST OF SYLT
- NA - HAMPTON BEACH NEW HAMPSHIRE BEACH EROSION CONTROL STUDY
- NA - FAIR HAVEN BEACH STATE PARK NEW YORK BEACH EROSION CONTROL STUDY
- NA - GUTACHTLICHE STELLUNGNAME ZU DEN UNTERSUCHUNGEN UBER DIE URSACHEN DER ABRUCHERSCHNEINUNGEN AM WEST UND NORD WESTSTRAND DER INSEL NORDERNEY
- NA - DIE URSACHEN DER ABRUCHERSCHNEINUNGEN AN WEST UND NORDWESTSTRAND DER INSEL NORDERNEY
- NA - HELGOLAND HISTORY OF ITS ORIGIN AND MAINTENANCE OF ITS HARBOR RELATIVE TO NAVIGATION
- NA - THE EFFECT OF ISLAND PROTECTIVE STRUCTURES ON BEACH DEVELOPMENT IN WEST PART OF NORDERNEY
- NA - ORIGIN AND DEVELOPMENT OF ISLAND PROTECTIVE WORKS ON NORDERNEY
- NA - UFERVERANDERUNGEN UND KUSTENSCHUTZ AUF SYLT
- NA - WHAT WATER ECONOMY EXPECTS FROM COASTAL RESEARCH
- NA - ANAHEIM BAY HARBOR CALIFORNIA
- NA - BEACH ABRASION BY WAVES - REFLECTION ON STEEP WALL TYPE OF COASTAL PROTECTIVE STRUCTURES
- NA - AREA 3 - NEW HAVEN HARBOR TO HOUSATONIC RIVER CONNECTICUT BEACH EROSION CONTROL STUDY
- NA - ASPHALT CONSTRUCTION IN GRUIN BUILDING
- NA - ABRUCH UND SCHUTZ DER STELLUFR AN DER OSTSEEKUSTE
- NA - GRAND ISLE LOUISIANA BEACH EROSION CONTROL STUDY

NOT ANNOTATED (CONTINUED)	
NA - SELKIRK SHOES STATE PARK NEW YORK BEACH EROSION CONTROL STUDY	54036GR0002
NA - APPENDIX VIII OHIO SHORE LINE OF LAKE ERIE BETWEEN VERMILLION AND SHEFFIELD LAKE VILLAGE BEACH EROSION CONTROL STUDY	5308GR0003
NA - DIE WERKUNG DER BUNNE H IN MANGEROUGE WEST AUF DIE SEEAGT	5200GR0004
NA - THEORETICAL OBSERVATIONS FOR INSTALLATION OF COASTAL PROTECTIVE STRUCTURES ON TIDELESS SHORES	5300GR0002
NA - AREA 7 - Housatonic River to Ash Creek Connecticut Beach Erosion Control Study	5310GR0004
NA - FOLGERUNGEN AUS UNTERSUCHUNGEN UBER KUSTENSCHUTZPROBLEME AUF SYLT	5700GR0007
NA - HAMLIN BEACH STATE PARK NEW YORK BEACH EROSION CONTROL STUDY	5504GR0006
NA - HYDRAULIC STRUCTURES (GROINS DAMS DYKES AND CANAL EMBANKMENTS) OF BITUMEN TYPE	5300GR0004
NA - PALM BEACH COUNTY FROM LAKE WORTH INLET TO SOUTH LAKE WORTH INLET FLORIDA BEACH EROSION CONTROL STUDY	5712GR0004
NA - BIOLOGICAL HELP IN COASTAL PROTECTION	5800GR0001
NA - SCHUTZ UND ENTWASSERUNG DER NIEDERUNGSGEBIETE AN DER SCHLESWIG-HOLSTEINISCHEN OSTSEEKUSTE	5800GR0002
NA - DUNE PROTECTIVE WORKS ON SYLT	5800GR0003
NA - ILLINOIS SHORE OF LAKE MICHIGAN BEACH EROSION CONTROL STUDY	5210GR0006
NA - STEEP SHORE OF BROUTEN - CAUSE OF BREAKING ***	5300GR0005
NA - KUSTENFORSCHUNGEN IM RAUM FERNHORN NORDWAGRIEN	5700GR0009
NA - ALLGEMEINE EMPFEHLUNGEN FUR DEN DEUTSCHEN KUSTENSCHUTZ	5500GR0002
NA - PLUM ARCHAUSCHUTTS BEACH EROSION CONTROL STUDY	5308GR0002
NA - DIE ABDRUCHSACHSEN AN DER NORDWESTKUSTE DES ELLENBOGENS AUF SYLT	5700GR0008
NA - VIRGINIA BEACH VIRGINIA BEACH EROSION CONTROL STUDY	5306GR0004
NA - AREA 4 - CONNECTICUT RIVER TO HAMMONSETT RIVER CONNECTICUT BEACH EROSION CONTROL STUDY	5206GR0001
NA - HUNDERT JAHRE KUSTENSCHUTZ AN DER NORWEGE	5500GR0003
NA - PINELLAS COUNTY FLORIDA BEACH EROSION CONTROL STUDY	5204GR0001
NA - MATERIALVANDRING PA HARKYSTER	5306GR0005
NA - FLOOD PROTECTION AND COAST STABILIZATION	5600GR0005
NA - WATER ECONOMY BETWEEN NORTH SEA AND BALTIC SEA 1948-58	5800GR0006
NA - SWELL AND SURGE AS BASIS FOR PLANNING AND DESIGN IN SEA STRUCTURES AND COASTAL PROTECTION	5800GR0007
NA - ARTIFICIAL RESTORATION OF BEACHES WITH SPECIAL REGARD FOR BEACH FLUSHING NOKDERNEY 1951-52	5700GR0014
NA - THAMES RIVER TO NIANTIC BAY CONNECTICUT BEACH EROSION CONTROL STUDY	5801GR0001
NA - OCEAN CITY NEW JERSEY BEACH EROSION CONTROL STUDY	5306GR0003
NA - BERRIEN COUNTY MICHIGAN BEACH EROSION CONTROL STUDY	5802GR0001
NA - POSSIBILITIES AND LIMITS FOR APPLICATION OF ASPHALT TYPES OF CONSTRUCTIONS FOR COASTAL PROTECTION	5700GR0013
NA - SHORE OF NEW JERSEY FROM SANDY HOOK TO BARNEGAT INLET BEACH EROSION CONTROL STUDY	5802GR0002
NA - ISLAND PROTECTION ON EAST FAERIAN SEA COAST	5600GR0003
NA - APPENDIX II COAST OF CALIFORNIA POINT MUGO TO SAN PEDRO BREAKWATER BEACH EROSION CONTROL STUDY	5311GR0002
NA - OCEANIDE OCEAN BEACH IMPERIAL BEACH AND CONONADO SAN DIEGO COUNTY CALIFORNIA BEACH EROSION CONTROL STUDY	5605GR0001
NA - AUS DEN ARBEITEN UES KUSTENAUSCHUSSES OST	5700GR0012
NA - COASTAL PROTECTION AND SCIENTIFIC BASIS OF RESEARCH	5600GR0002
NA - WHAT HAPPENED TO PROTECTION OF OUR BALTIC SEA COAST	5600GR0001
NA - SOME IDEAS ON THE PROBLEM OF RESEARCH IN COASTAL DYNAMICS AND MODEL TESTS OF COASTAL PROTECTION	5509GR0002
NA - CITY OF KENOSHA WISCONSIN BEACH EROSION CONTROL STUDY	5605GR0003
NA - FIRE ISLAND INLET TO JONES INLET LONG ISLAND NEW YORK COOPERATIVE BEACH EROSION CONTROL STUDY	5400GR0003
NA - AREA 9 EAST RIVER TO NEW HAVEN HARBOR CONNECTICUT BEACH EROSION CONTROL STUDY	5212GR0001
NA - ACTUAL PROBLEMS OF COASTAL PROTECTION	5600GR0008
NA - APPENDIX IV OHIO SHORE LINE OF LAKE ERIE SANDUSKY TO VERMILLION OHIO BEACH EROSION CONTROL STUDY	5600GR0007
NA - SOUTH KINGSTON AND WESTERLY RHODE ISLAND BEACH EROSION CONTROL STUDY	5600GR0006
NA - MODEL TESTS WITH MOVEABLE FLOOR IN SEA AND SEA HARBOR CONSTRUCTION	5400GR0002
NA - AREA 5 PAMCATUCK RIVER TO THAMES RIVER CONNECTICUT BEACH EROSION CONTROL STUDY	5212GR0001
NA - ASPHALT GROINS IN USA	5600GR0008
NA - COASTAL CHANGES AND COASTAL PROTECTION OF THE ISLAND HIDDENSEE	5600GR0007
NA - SUITABILITY OF MODEL TESTS IN MARITIME ENGINEERING IN HARBORS SEAWAYS AND COASTAL PROTECTION	5600GR0006
NA - APPENDIX IV OHIO SHORE LINE OF LAKE ERIE SANDUSKY BAY OHIO BEACH EROSION CONTROL STUDY	5304GR0003
NA - APPENDIX XIV OHIO SHORE LINE OF LAKE ERIE SHEFFIELD LAKE VILLAGE TO ROCKY RIVER BEACH EROSION CONTROL STUDY	5205GR0001
NA - REPORT ON CONCRETE BLOCK GROINS	

NOT ANNOTATED (CONTINUED)

NA - MANITOWOC COUNTY FROM TWO RIVERS TO MANITOWOC WISCONSIN BEACH EROSION CONTROL STUDY 5602GR0002

NA - SHORE OF NEW JERSEY FROM SANDY HOOK TO BARNEGAT INLET BEACH EROSION CONTROL STUDY 5603GR0001

NA - ON THE COASTAL GROINS 5411GR0001

NA - ANNA MARIA AND LONGBOAT KEYS FLORIDA BEACH EROSION STUDY 4812GR0004

NA - APPENDIX 1A - SHORE OF LAKE ERIE IN LAKE COUNTY OHIO BEACH EROSION CONTROL STUDY 5005GR0001

NA - PRESQUE ISLE PENINSULA ERIE PENNSYLVANIA BEACH EROSION CONTROL STUDY 5005GR0002

NA - WINTHROP BEACH MASSACHUSETTS BEACH EROSION CONTROL STUDY 4812GR0003

NA - COLONIAL BEACH VIRGINIA BEACH EROSION CONTROL STUDY 4909GR0001

NA - BEACH EROSION STUDY CORONADO CALIFORNIA 4202GR0001

NA - NORTH CAROLINA SHORE LINE BEACH EROSION STUDY 4812GR0001

NA - BEACH EROSION STUDY ST SIMON ISLAND GEORGIA 4010GR0002

NA - HARRISON COUNTY MISSISSIPPI BEACH EROSION CONTROL STUDY 4805GR0001

NA - BEACH EROSION STUDY ORANGE COUNTY CALIFORNIA 4002GR0001

NA - PUNTA LAS MARIAS SAN JUAN P. R. BEACH EROSION CONTROL STUDY 4812GR0002

NA - SANTA BARBARA CALIFORNIA BEACH EROSION CONTROL STUDY 4812GR0006

NA - SOUTH SHORE STATE OF RHODE ISLAND BEACH EROSION CONTROL STUDY 5002GR0002

NA - ATLANTIC CITY NEW JERSEY BEACH EROSION CONTROL STUDY 5003GR0001

NA - BEACH EROSION STUDY OF BAKERS HAULOVER INLET FLORIDA 4604GR0002

NA - ORIGIN AND DECLINE OF THE ISLAND TRISCHEN 5002GR0002

NA - AREA 2 - HAMMONSETT RIVER TO EAST RIVER CONNECTICUT BEACH EROSION CONTROL STUDY 5002GR0001

NA - AREA 1 - ASH CREEK TO SAUGATUCK RIVER CONNECTICUT BEACH EROSION CONTROL STUDY 5001GR0001

NA - SEVERE BEACH MASSACHUSETTS BEACH EROSION CONTROL STUDY 5105GR0001

NA - SEAGROINS AND GROINS WITH WEAK TIDES AND STRONG SAND DRIFT 5100GR0002

NA - QUINCY SHORE BEACH MASSACHUSETTS BEACH EROSION CONTROL STUDY 5105GR0002

NA - BEACH EROSION STUDY LAKE MICHIGAN SHORE LINE OF MILWAUKEE COUNTY WISCONSIN 4604GR0001

NA - REVERE BEACH MASSACHUSETTS BEACH EROSION CONTROL STUDY 5105GR0003

NA - REPORT TO THE 17TH INTERNATIONAL NAVIGATION CONGRESS 4900GR0002

NA - SEA TRANSPORTATION STRUCTURES III-8 4900GR0008

NA - WATER ECONOMY BETWEEN NORTH AND BALTIC SEA KIEL 5100GR0001

NA - CLEVELAND AND LAKEWOOD OHIO BEACH EROSION CONTROL STUDY 5003GR0002

NA - REPORT TO THE 17TH INTERNATIONAL NAVIGATION CONGRESS 4900GR0007

NA - REPORT TO THE 17TH INTERNATIONAL NAVIGATION CONGRESS 4900GR0006

NA - NIAGARA COUNTY NEW YORK BEACH EROSION STUDY 4308GR0001

NA - PROBLEMS OF ISLAND AND COAST PROTECTION 4500GR0001

NA - PALM BEACH FLORIDA BEACH EROSION STUDY 4812GR0005

NA - BEACH EROSION STUDY LAKE ERIE SHORE LINE IN THE VICINITY OF HURON OHIO 4505GR0001

NA - JUPITER ISLAND FLORIDA BEACH EROSION STUDY 4812GR0007

NA - REPORT ON THE USE OF ASPHALT AT GROIN CONSTRUCTION IN DELFTLAND (HOLLAND) 4600GR0001

NA - BEACH EROSION STUDY OHIO SHORE LINE OF LAKE ERIE FROM OHIO - MICHIGAN STATE LINE TO MARBLEHEAD OHIO 4505GR0002

NA - UNDERWATER LONGITUDINAL WORKS FOR COASTAL PROTECTION 5200GR0001

NA - DIE BURNENWIRKUNG 2806GR0002

NA - BEACH EROSION AT MANASQUAN INLET NEW JERSEY AND ADJACENT BEACHES 3701GR0001

NA - CAUSES OF COAST EROSION AND ACCRETION 2600GR0001

NA - BEACH EROSION AT SANTA BARBARA CALIFORNIA 3803GR0001

NA - BEACH EROSION AT WILLOUGHBY SPIT VIRGINIA 3801GR0003

NA - FORT FISHER NORTH CAROLINA 3201GR0001

NA - BEACH EROSION AT JACOB RILS PARK LONG ISLAND NEW YORK 3601GR0002

NA - PATENT NO 19786 3512GR0002

NA - MODEL TESTS OF BEACH BREAK AT THE END OF STABILIZED COASTAL BEACHES LEE-EROSION 0000GR0004

NA - STUDY OF AN ARTIFICIAL BATHING BEACH AT ORCHARD BEACH PELHAM BAY NEW YORK 3711GR0002

NA - BEACH EROSION AT COMPO BEACH WESTPORT CONNECTICUT 3506GR0001

NA - BEACH EROSION AT FOLLY BEACH SOUTH CAROLINA 3504GR0001

NA - PERMEABLE GROINS OF CONCRETE CHECK BEACH EROSION 3500GR0001

NA - BEACH EROSION AT GALVESTON TEXAS 3406GR0001

NA - BEACH EROSION AT HOLLYWOOD BEACH FLORIDA 3705GR0001

NA - WRIGHTSVILLE BEACH NORTH CAROLINA 3401GR0001

NOT ANNOTATED	(CONTINUED)	0000GR0007
NA - ON THE LENGTH AND THE INTERNAL STRUCTURE OF SEASHORE GROINS		
NOTCHED		
VARIATIONS IN GROIN DESIGN		6510GR0001
VARIATIONS IN GROIN DESIGN		6705GR0001
CURVED GROINS AND FORESHORE DEFENCE		5607SR0002
BEACH EROSION STUDIES		4000GR0001
N. ATLANTIC		
VARIATIONS IN GROIN DESIGN		6705GR0001
BEACH EROSION CONTROL IN NEW ENGLAND		6910GR0001
SHORE PROTECTION EXPERIENCE IN THE UNITED STATES		6707GR0001
VARIATIONS IN GROIN DESIGN		6510GR0001
THE ATLANTIC COAST OF LONG ISLAND		6809GR0007
BEACH BEHAVIOR NORTH SHORE LONG ISLAND SOUND		7011GR0001
THE PROTECTION AND PRESERVATION OF THE ATLANTIC SHORE FRONT OF THE STATE OF NEW YORK		6207GR0002
UNFINISHED BUSINESS NEW JERSEY GROIN PROJECT STALLED BY WINTER		5904GR0001
A CONTRACTOR BATTLES THE TIDES		6004GR0001
BEHAVIOR OF BEACH FILLS IN NEW ENGLAND		6200GR0002
COASTAL PROTECTION IN MASSACHUSETTS		6010GR0002
AERIAL PHOTOGRAPHS PLUM ISLAND MASSACHUSETTS		6208GR0001
BEHAVIOR OF BEACH FILL AND BORROW AREA AT PRUSPECT BEACH WEST HAVEN CONNECTICUT		6108GR0001
COASTAL ENGINEERING STRUCTURES		6307GR0001
BEHAVIOR OF SAND ASPHALT GROINS AT OCEAN CITY MARYLAND		5905GR0001
ASPHALT IN BEACH EROSION CONTROL STRUCTURES		6204GR0003
BEHAVIOR OF BEACH FILLS IN NEW ENGLAND		6102SR0001
AERIAL PHOTOGRAPHS OF WALLS' SAND STATE BEACH RYE NEW HAMPSHIRE		6306GR0001
A PICTORIAL HISTORY OF SELECTED STRUCTURES ALONG THE NEW JERSEY COAST		6310GR0001
SOME ASPECTS OF SHORE PROTECTION IN BOSTON HARBOR		5210GR0004
HOW TO BUILD A BEACH AT ECONOMY PRICES		5509GR0001
DURABILITY OF THE NEW JERSEY SHORE		5210GR0005
DEVELOPMENT OF STEEL SHEET PILING IN SHORE STRUCTURES		5202GR0001
PHOTOGRAPHS OF COMPO BEACH WESTPORT CONNECTICUT AFTER GROIN CONSTRUCTION AND BEFORE FILL PLACEMENT		5705GR0001
THE ASPHALT GROINS AT OCEAN CITY MARYLAND		5504GR0001
ASPHALT GROINS - TWO YEAR PLAN		5708GR0001
ASPHALT GROINS AND JETTIES		5511GR0002
PHOTOGRAPHS OF SASSO HILL BEACH FAIRFIELD CONNECTICUT AFTER GROIN CONSTRUCTION AND BEFORE FILL PLACEMENT		5705GR0002
MARYLAND'S FAVORITE BEACH AT OCEAN CITY		5510GR0001
BEHAVIOR OF BEACH FILL AT OCEAN CITY NEW JERSEY		5602GR0001
CONCRETE BLOCKS FORM LOW-COST GROINS		5304GR0001
PRECAST CONCRETE BLOCK GROINS		5210GR0002
LIFE OF STEEL SHEET PILE STRUCTURES IN ATLANTIC COASTAL STATES		4405GR0001
EROSION OF OUR COASTAL FRONTIERS - PART II		4900SR0003
REPORT TO THE 17TH INTERNATIONAL NAVIGATION CONGRESS		4910SR0003
PLANNING SHORE PROTECTION		4006GR0001
REPORT ON SHORE EROSION AT TILGHMAN POINT MARYLAND		4410GR0001
STEEL SHEET PILING FOR SHORE AND BEACH PROTECTION STRUCTURES		4001GR0003
HAWKS NEST BEACH CONNECTICUT		4206GR0001
BEACH PROTECTION MEASURES		3812GR0001
EFFECTIVENESS OF GROINS AT ROCKAWAY BEACH LONG ISLAND NEW YORK		4806SR0001
PAPER ON PROTECTIVE WORKS ADAPTED TO LIMIT EROSION ALONG THE OPEN COAST HOW THEY WORK		3604GR0002
JACOB RIIS PARK		2300GR0001
CONEY ISLAND PUBLIC BEACH AND BOARDWALK IMPROVEMENT		1508GR0001
COAST EROSION AND PROTECTION ON LONG ISLAND AND NEW JERSEY		3804GR0001
EROSION OF OUR COASTAL FRONTIERS		3610GR0002
CONSTRUCTION AND MAINTENANCE OF THE PUBLIC BEACH AT ROCKAWAY BEACH BOROUGH OF QUEENS		3602SR0001
MESH JETTIES		3106GR0001
SAND MOVEMENT AND BEACH EROSION		

N. ATLANTIC	(CONTINUED)	38076R00003
SHORE PROTECTIVE WORK AT WINTHROP MASSACHUSETTS		38016R00002
REPORT ON EROSION AT MARASQUAN INLET NEW JERSEY AND ADJACENT BEACHES		3806GR00001
SHORE PROTECTIVE WORK AT WINTHROP MASSACHUSETTS		
N. PACIFIC		
APPLICATION OF ASPHALT IN HYDRAULIC ENGINEERING WORKS		5101GR00001
PATENT		
ART OF BEACH PROTECTION		
JETTY		4510GR00001
ART OF FORMING PROTECTIVE BEACHES		3711GR00001
JETTY		3309GR00001
JETTY		3505GR00001
JETTY		3505GR00002
THE WOSENITZ PRECAST PERMEABLE GROIN		0000GR00005
PERMEABLE		
MARITIME AND RIPARIAN USE OF GABIONS		6512GR00001
STUDY OF EROSION ALONG HOMER SPIT AND VICINITY KACHEMAK BAY ALASKA		6511GR00001
VARIATIONS IN GROIN DESIGN		6510GR00001
SHORE PROTECTION PLANNING AND DESIGN		6406GR00002
EXPERIMENT IN SHORE PROTECTION		7105GR00001
COASTAL PROCESSES		6606GR00001
SCOURING DUE TO WAVE ACTION AT THE TOE OF PERMEABLE COASTAL STRUCTURES		6609GR00001
THE EFFECT OF GROYNES ON STABLE BEACHES		6809GR00002
VARIATIONS IN GROIN DESIGN		6705GR00001
COASTAL ENGINEERING STRUCTURES		6307GR00001
OCEANOGRAPHICAL ENGINEERING		6400GR00003
SHORELINE ADVANCEMENT BY SEA WALL AND GROYNES AT COCHIN		6008GR00003
GROINS FROM WISCONSIN ON LAKE MICHIGAN		6500GR00001
A STUDY OF GROINS AND THEIR FUNCTION AS HYDRAULIC STRUCTURES		6107GR00001
PHOTOGRAPHS OF SARASOTA COUNTY FLORIDA SHOWING GROIN INSTALLATION		6200GR00001
STABILITY OF BEACHES USING GROINS		6406GR00001
GROINS ON THE SHORE OF THE GREAT LAKES		6105GR00001
CONSTRUCTION WORKS FOR THE PROTECTION OF THE COASTS		6300GR00002
STRUCTURES FOR SHORE PROTECTION		6307GR00003
GROINS ON THE SHORES OF THE GREAT LAKES		6111GR00001
REVIEW OF BEACH EROSION AND STORM TIDE CONDITIONS IN FLORIDA 1961-1962		6211GR00001
PERMEABLE AND SEMIPERMEABLE GROINS FROM OHIO ON LAKE ERIE		6500GR00003
PERMEABLE GROINS FROM ILLINOIS ON LAKE MICHIGAN		6310GR00001
COASTAL PROTECTION FOR FLORIDA		6204GR00004
COAST PROTECTION - GROYNES SYSTEMS		6204GR00002
USE OF CONCRETE FOR SHORE PROTECTION		6009GR00001
COAST EROSION AND DEFENCE		5609GR00002
TIMBER IN THE CONSTRUCTION OF SEA DEFENCE AND RIVER WORKS		5700GR00001
IMPERMEABLE AND PERMEABLE GROINS		5500GR00001
CONCRETE SHORE PROTECTION		5510GR00001
MARYLANDS FAVORITE BEACH AT OCEAN CITY		5810GR00001
AN EXPERIMENTAL STUDY ON THE EFFECT OF COASTAL GROINS		5300GR00001
LAKE MICHIGAN EROSION STUDIES		5509GR00001
HOW TO BUILD A BEACH AT ECONOMY PRICES		5210GR00003
CASE HISTORY OF SHORE PROTECTION AT PRESQUE ISLE PENINSULA PENNSYLVANIA		5712GR00001
FLORIDA COASTAL PROBLEMS		5800GR00004
BASIC COASTAL MODEL		5511GR00001
COASTAL DEVELOPMENT AND COASTAL PROTECTION		5409GR00003
PROBLEMS DE DEFENSE DES COTES RESUSSITE DE ECHECS DE QUELQUES OUVRAGES		4406GR00002
WAVE ACTION ON BEACHES		4001GR00001
PERMEABLE GROINS AT KENOSHA WISCONSIN		4510GR00001
ART OF BEACH PROTECTION		
THE RELATION OF THE ACTION OF WAVES AND CURRENTS ON HEADLANDS TO THE CONTROL OF SHORE EROSION BY GROINS		4300GR00001

PERMEABLE (CONTINUED)
 REPORT TO THE 17TH INTERNATIONAL NAVIGATION CONGRESS
 INFLUENCE OF GROINS ON BEACH STABILIZATION
 EFFECTIVENESS OF PERMEABLE TYPE GROINS USED FOR BEACH PROTECTION AT SHOREWOOD WISCONSIN AND OTHER CITIES ALONG THE WEST SHORE OF LAKE MICHIGAN 4900GR0004
 SHORE PROTECTION BY PERMEABLE GROINS 5101GR0002
 BEACH PROTECTION MEASURES 3911GR0001
 DESIGN AND CONSTRUCTION OF GROINS 3907GR0001
 BEACH EROSION STUDIES 4210GR0001
 REPORT ON ST. SIMON ISLAND STUDIES 5010GR0001
 THE ACTION OF GROINS ON BEACH STABILIZATION 3901GR0001
 CONCRETE SHORE PROTECTION STRUCTURES 4101GR0001
 SOME SEA DEFENCE WORKS FOR RECLAIMED LANDS 4804GR0001
 SUMMARY REPORT ON STUDIES OF SAND TRANSPORTATION BY WAVE ACTION 4406GR0003
 BEACH PROTECTION MEASURES 4602GR0001
 PERMEABLE JETTIES BUILT TO PROTECT CLEVELANDS SHORE 4507GR0001
 PIERS AND JETTIES OF PRECAST CONCRETE 4602GR0002
 REPORT TO THE 17TH INTERNATIONAL NAVIGATION CONGRESS 4900GR0005
 EROSION OF OUR COASTAL FRONTIERS - PART II 4405GR0001
 THE BUDD HORIZONTALLY PERMEABLE GROIN SYSTEM FOR BEACH EROSION CONTROL AND REBUILDING SAND BEACHES 0000GR0005
 THE PRINCIPLE OF INCREASING PERMEABILITY IN GROIN CONSTRUCTION 0000GR0008
 ROUND-TABLE DISCUSSION 3604GR0001
 MAN AGAINST THE SEA A GUIDE TO EROSION CONTROL 0000GR0009
 REPORT OF THE FRESHWATER EROSION BOARD 3612GR0001
 JETTY 3505GR0001
 JETTY 3711GR0001
 A NEW METHOD OF CONSTRUCTION IN COAST EROSION CONTROL 3507GR0001
 JETTY 3711GR0001
 MESH JETTIES 3505GR0002
 ART OF FORMING PROTECTIVE BEACHES 3308GR0001
 SHOREWOOD PROTECTS ITS LAKE FRONT 3602GR0001
 CERTAIN POINTS ABOUT EROSION COSTS AND MEASURES OF PROTECTION 3807GR0004
 DIE SCHUTZBAUTEN AUF DER INSEL BORKUM 3601GR0001
 EFFECTIVENESS OF GROINS AT HOCKAWAY BEACH LONG ISLAND NEW YORK 3512GR0001
 COAST PROTECTION ON THE NORTH SEA COASTS OF HOLLAND FRANCE BELGIUM AND GERMANY 3812GR0001
 CONSTRUCTION AND MAINTENANCE OF THE PUBLIC BEACH AT ROCKAWAY BEACH BOROUGH OF QUEENS 3703GR0001
 THE WUSENITZ PRECAST PERMEABLE GROIN 3610GR0002
 EROSION OF OUR COASTAL FRONTIERS 0000GR0005
 THE NORTH SHORE VERSUS LAKE MICHIGAN 3804GR0001
 THE NORTH SHORE VERSUS LAKE MICHIGAN 3011GR0001
 ROUND-TABLE DISCUSSION OF SHORE PROBLEMS IN RELATION TO RECREATION 3011GR0001
 PHOTOGRAPHIC 3710GR0001
 VARIATIONS IN GROIN DESIGN 6705GR0001
 SHORE PROTECTION PLANNING AND DESIGN 6510GR0001
 PHOTOGRAPHS OF SARASOTA COUNTY FLORIDA SHOWING GROIN INSTALLATION 6606GR0002
 REVIEW OF BEACH EROSION AND STORM TIDE CONDITIONS IN FLORIDA 1961-1962 6200GR0001
 THE PROTECTION AND PRESERVATION OF THE ATLANTIC SHORE FRONT OF THE STATE OF NEW YORK 6211GR0001
 PERMEABLE GROINS FROM ILLINOIS ON LAKE MICHIGAN 6207GR0002
 GROINS FROM WISCONSIN ON LAKE MICHIGAN 6500GR0002
 AERIAL PHOTOGRAPHS PLUM ISLAND MASSACHUSETTS 6208GR0001
 EFFECTS OF LARGE STRUCTURES ON THE OHIO SHORE OF LAKE ERIE 6500GR0001
 AERIAL PHOTOGRAPHS OF WALLIS SAND STATE BEACH RYE NEW HAMPSHIRE 6400GR0002
 A PICTORIAL HISTORY OF SELECTED STRUCTURES ALONG THE NEW JERSEY COAST 6306GR0001
 INTERIM REPORT ON ASPHALT GROINS AT OCEAN CITY MARYLAND 6410GR0001
 PHOTOGRAPHS OF SASSO HILL BEACH FAIRFIELD CONNECTICUT AFTER GROIN CONSTRUCTION AND BEFORE FILL PLACEMENT 5607GR0001
 PHOTOGRAPHS OF COMPO BEACH WESTPORT CONNECTICUT AFTER GROIN CONSTRUCTION AND BEFORE FILL PLACEMENT 5705GR0002
 5705GR0001

PHOTOGRAPHIC	5309GR0001
EXPERIMENTAL GROINS CAMP PERRY OHIO	5400GR0001
PHOTOGRAPHS OF FORT MACON NEAR MOREHEAD CITY NORTH CAROLINA AFTER SERIES OF HURRICANES IN 1954	3912GR0001
EROSION AND PALMETTO GROINS AT NORTH POINT ST.AUGUSTINE FLORIDA	5101GR0002
INFLUENCE OF GROINS ON BEACH STABILIZATION	4405GR0001
EROSION OF OUR COASTAL FRONTIERS - PART II	4806GR0002
WAVE ACTION ON BEACHES	4804GR0001
THE ACTION OF GROINS ON BEACH STABILIZATION	3811GR0001
SHORE EROSION AND CABBASE PALMETTO GROINS AT NORTH POINT ST.AUGUSTINE FLORIDA	3607GR0002
INVESTIGATIONS OF STEEL SHEET PILING	0000GR0005
THE BUDD HORIZONTALLY PERMEABLE GROIN SYSTEM FOR BEACH EROSION CONTROL AND REBUILDING SAND BEACHES	
PILING	
COLORLED SAND TESTS WITH LUMINESCENT SAND IN GROIN FIELDS	7000GR0001
VARIATIONS IN GROIN DESIGN	6705GR0001
CHARACTERISTICS OF SHINGLE BEACHES: THE SOLUTION TO SOME PRACTICAL PROBLEMS	7009GR0006
DUSAL CREEK ENTRANCE	6809GR0008
SHORE PROTECTION PLANNING AND DESIGN	6606GR0002
EMERGENCY METHODS TO COMBAT BEACH EROSION	6504GR0001
VARIATIONS IN GROIN DESIGN	6510GR0001
SEA GROINS EFFECTIVENESS INVESTIGATIONS BY DYED SAND TESTS	6600GR0001
DESIGN AND CONSTRUCTION OF THE SEAL BEACH GROIN	6010GR0001
EMERGENCY MEASURES TO COMBAT BEACH EROSION	6306GR0002
THE SELSEY COAST PROTECTION SCHEME	6112GR0001
GROINS FROM WISCONSIN ON LAKE MICHIGAN	6500GR0001
A PICTORIAL HISTORY OF SELECTED STRUCTURES ALONG THE NEW JERSEY COAST	6410GR0001
SHORELINE ADVANCEMENT BY SEA WALL AND GROYNES AT COCHIN	6008GR0003
REVIEW OF BEACH EROSION AND STORM TIDE CONDITIONS IN FLORIDA 1961-1962	6211GR0001
GROINS ON THE SHORE OF THE GREAT LAKES	6105GR0001
REVIEW OF GERMAN EXPERIENCE ON COASTAL PROTECTION BY GROINS	6307GR0002
COASTAL PROTECTION FOR FLORIDA	6310GR0001
SHEET STEEL PILING FOR SHORE PROTECTION STRUCTURES	6210GR0001
PERMEABLE AND SEMIPERMEABLE GROINS FROM OHIO ON LAKE ERIE	6500GR0003
COAST PROTECTION SOME RECENT WORKS ON THE EAST COAST 1942-52	5306GR0001
DIVISION OF SHORE EROSION - OHIO	5510GR0002
LAKE MICHIGAN EROSION STUDIES	5300GR0001
THE FERNANDINA BEACH GROINS	5504GR0002
COASTAL PROTECTION REVIEW OF METHODS FOR DEFENCE	5311GR0001
COASTAL DEVELOPMENT AND COASTAL PROTECTION	5511GR0001
SOME SEA DEFENCE WORKS FOR RECLAIMED LANDS	4602GR0001
EFFECTIVENESS OF PERMEABLE TYPE GROINS USED FOR BEACH PROTECTION AT SHOREWOOD WISCONSIN AND OTHER CITIES ALONG T	
HE WEST SHORE OF LAKE MICHIGAN	3911GR0001
PAPER ON PROTECTIVE WORKS ADAPTED TO LIMIT EROSION ALONG THE OPEN COAST HOW THEY WORK	4806GR0001
COAST EROSION AND PROTECTION - STUDIES IN CAUSES AND REMEDIES	5200GR0002
EROSION AND PALMETTO GROINS AT NORTH POINT ST.AUGUSTINE FLORIDA	3912GR0001
REPORT TO THE 17TH INTERNATIONAL NAVIGATION CONGRESS	4900GR0001
REPORT ON ST.SIMON ISLAND STUDIES	4101GR0001
ART OF BEACH PROTECTION	4510GR0001
DURABILITY OF STEEL SHEET PILING IN SHORE STRUCTURES	5202GR0001
THE DANISH WESTCOAST - LITTORAL DRIFT PROBLEMS AND MEASURES AGAINST COAST EROSION	5008GR0001
BEACH PROTECTION MEASURES	4210GR0001
THE PROBLEM OF COAST EROSION	4700GR0001
SHORE PROTECTION METHODS AND MATERIALS	4410GR0002
ALL STEEL GROYNES - MIAMI BEACH	4910GR0002
EROSION CONTROL AT WRIGHTSVILLE BEACH	4010GR0001
BEACH EROSION STUDIES	4000GR0002
EROSION PROBLEMS ON THE OHIO SHORE OF LAKE ERIE	5204GR0001
STEEL SHEET PILING FOR SHORE AND BEACH PROTECTION STRUCTURES	4410GR0001

PILING

(CONTINUED)

REPORT TO THE 17TH INTERNATIONAL NAVIGATION CONGRESS

COAST EROSION

PERMEABLE GROINS AT KENOSHA WISCONSIN

BEACH PROTECTION ENGINEERS ATTEMPT TO OUTWIT NATURE AT PRESQUE ISLE PENINSULA

BEACH PROTECTION ENGINEERS

REPORT TO THE 17TH INTERNATIONAL NAVIGATION CONGRESS

THE ROSENITZ PRECAST PERMEABLE GROIN

SHORE EROSION AND CABBAGE PALMETTO GROINS AT NORTH POINT ST. AUGUSTINE FLORIDA

COAST PROTECTION ON THE NORTH SEA COASTS OF HOLLAND FRANCE BELGIUM AND GERMANY

DIE SCHUTZBAUTEN AUF DER INSEL BORKUM

INVESTIGATIONS OF STEEL SHEET PILING

EFFECTIVENESS OF GROINS AT ROCKAWAY BEACH LONG ISLAND NEW YORK

GROYNES

JETTY

JETTY

REPORT ON BEACH EROSION AT HOLLYWOOD BEACH FLORIDA

JETTY

CONY ISLAND PUBLIC BEACH AND BOARDWALK IMPROVEMENT

BEACH EROSION STUDIES

REPORT OF ADVISORY BOARD ON BEACH PROTECTION LOS ANGELES COUNTY

SEA WALLS AND GROINS OF STEEL SHEETING STABILIZE MIAMI BEACH

ROUND-TABLE DISCUSSION OF SHORE PROBLEMS IN RELATION TO RECREATION

SHORE PROTECTION BY PERMEABLE GROINS

REPORT TO THE 15TH INTERNATIONAL NAVIGATION CONGRESS

RUBBLE-MOUND

LAND RECLAMATION AND GROIN-BUILDING IN THE TIDAL FLATS

EMERGENCY METHODS TO COMBAT BEACH EROSION

SHORE PROTECTION PLANNING AND DESIGN

VARIATIONS IN GROIN DESIGN

THE HISTORY OF THE DUTCH COAST IN THE LAST CENTURY

VARIATIONS IN GROIN DESIGN

BEACH BEHAVIOR NORTH SHORE LONG ISLAND SOUND

THE ATLANTIC COAST OF LONG ISLAND

NEW COASTAL WORKS AT NAHARIYA (ISRAEL)

COASTAL PROTECTION FOR FLORIDA

GROINS FROM WISCONSIN ON LAKE MICHIGAN

PERMEABLE AND SEMIPERMEABLE GROINS FROM OHIO ON LAKE ERIE

REVIEW OF BEACH EROSION AND STORM TIDE CONDITIONS IN FLORIDA 1961-1962

GROINS ON THE SHORE OF THE GREAT LAKES

VIEW OF GERMAN EXPERIENCE ON COASTAL PROTECTION BY GROINS

A CONTRACTOR BATTLES THE TIDES

SHORELINE ADVANCEMENT BY SEA WALL AND GROYNES AT COCHIN

AERIAL PHOTOGRAPHS PLUM ISLAND MASSACHUSETTS

BEHAVIOR OF BEACH FILLS IN NEW ENGLAND

COASTAL PROTECTION IN MASSACHUSETTS

PERMEABLE GROINS FROM ILLINOIS ON LAKE MICHIGAN

SHEET STEEL PILING FOR SHORE PROTECTION STRUCTURES

AERIAL PHOTOGRAPHS OF WALLS SAND STATE BEACH RYE NEW HAMPSHIRE

BEHAVIOR OF BEACH FILLS IN NEW ENGLAND

BEHAVIOR OF BEACH FILL AND BORROW AREA AT PROSPECT BEACH WEST HAVEN CONNECTICUT

EMERGENCY MEASURES TO COMBAT BEACH EROSION

COASTAL ENGINEERING STRUCTURES

PHOTOGRAPHS OF COMPO BEACH WESTPORT CONNECTICUT AFTER GROIN CONSTRUCTION

SOME ASPECTS OF SHORE PROTECTION IN BOSTON HARBOR

COASTAL DEVELOPMENT AND COASTAL PROTECTION

4900GR0003
5000GR0003
4001GR0001
5109GR0001
4206GR0001
4900GR0005
0000GR0005
3811GR0001
3703GR0001
3512GR0001
3607GR0002
3812GR0001
3400GR0001
3711GR0001
3505GR0002
3801GR0001
3505GR0001
2300GR0001
3901GR0001
3012GR0001
3105GR0001
3710GR0001
3907GR0001
3100GR0002

7009GR0004
6504GR0001
6606GR0002
9705GR0001
7009GR0001
6510GR0001
7011GR0001
6809GR0007
6502GR0001
6310GR0001
6500GR0001
6500GR0003
6211GR0001
6105GR0001
6307GR0002
6004GR0001
6410GR0001
6008GR0003
6208GR0001
6102GR0001
6010GR0002
6500GR0002
6210GR0001
6306GR0001
6200GR0002
6108GR0001
6306GR0002
6307GR0001
5705GR0001
5210GR0001
5511GR0001

RUBBLE-MOUND	5300GR0003
REPORT TO THE 14TH INTERNATIONAL NAVIGATION CONGRESS	5800GR0004
BASIC COASTAL MODEL	5712GR0002
SOME COASTAL ENGINEERING PROBLEMS IN INDIA	5510GR0002
DIVISION OF SHORE EROSION - OHIO	5705GR0002
PHOTOGRAPHS OF SASSCO HILL BEACH FAIRFIELD CONNECTICUT AFTER GROIN CONSTRUCTION AND BEFORE FILL PLACEMENT	5602GR0001
BEHAVIOR OF BEACH FILL AT OCEAN CITY NEW JERSEY	5400GR0001
PHOTOGRAPHS OF FORT MACON NEAR MOREHEAD CITY NORTH CAROLINA AFTER SERIES OF HURRICANES IN 1954	5309GR0001
EXPERIMENTAL GROINS CAMP PERRY OHIO	5812GR0002
PROTECTING OUR SHORE LINE	5701GR0001
PROTECTION WORKS ON THE MEXICAN COAST THE CREATION OF BEACHES AND DUNES	5210GR0003
INFORMATION ON BEACH PROTECTION IN FLORIDA	5409GR0001
FUNDAMENTALS OF COAST EROSION AND DEFENCE	5109GR0001
BEACH PROTECTION ENGINEERS ATTEMPT TO OUTWIT NATURE AT PRESQUE ISLE PENINSULA	4900GR0001
REPORT TO THE 17TH INTERNATIONAL NAVIGATION CONGRESS	4001GR0001
PERMEABLE GROINS AT KENOSHA WISCONSIN	5204GR0001
EROSION PROBLEMS ON THE OHIO SHORE OF LAKE ERIE	4001GR0003
HAWKS NEST BEACH CONNECTICUT	4806GR0001
PAPER ON PROTECTIVE WORKS ADAPTED TO LIMIT EROSION ALONG THE OPEN COAST HOW THEY WORK	4900GR0003
REPORT TO THE 17TH INTERNATIONAL NAVIGATION CONGRESS	4410GR0001
STEEL SHEET PILING FOR SHORE AND BEACH PROTECTION STRUCTURES	3911GR0001
EFFECTIVENESS OF PERMEABLE TYPE GROINS USED FOR BEACH PROTECTION AT SHOREWOOD WISCONSIN AND OTHER CITIES ALONG T	5010GR0001
THE WEST SHORE OF LAKE MICHIGAN	5008GR0001
DESIGN AND CONSTRUCTION OF GROINS	4006GR0001
THE DANISH WEST COAST LITTORAL DRIFT PROBLEMS AND MEASURES AGAINST COAST EROSION	4904GR0001
REPORT ON SHORE EROSION AT TILGHMAN POINT MARYLAND	4005GR0003
COAST PROTECTION	5000GR0003
THE PREVENTION OF COAST EROSION	4410GR0002
COAST EROSION	3100GR0002
SHORE PROTECTION METHODS AND MATERIALS	3011GR0001
REPORT TO THE 15TH INTERNATIONAL NAVIGATION CONGRESS	2300GR0001
THE NORTH SHORE VERSUS LAKE MICHIGAN	3612GR0001
CONEY ISLAND PUBLIC BEACH AND BOARDWALK IMPROVEMENT	3605GR0001
REPORT OF THE FRESHSHORE EROSION BOARD	3309GR0001
SOME DATA ON BEACH PROTECTIVE WORKS	3512GR0001
ART OF FORMING PROTECTIVE BEACHES	3901GR0001
DIE SCHUTZBAUTEN AUF DER INSEL HORKUM	3703GR0001
BEACH EROSION STUDIES	3807GR0001
COAST PROTECTION ON THE NORTH SEA COASTS OF HOLLAND FRANCE BELGIUM AND GERMANY	6609GR0001
EARLY ATTEMPTS AT INLET CONSTRUCTION ON THE FLORIDA EAST COAST	7000GR0001
SCOUR	7009GR0001
SCOURING DUE TO WAVE ACTION AT THE TOE OF PERMEABLE COASTAL STRUCTURES	6512GR0001
COLORADO SAND TESTS WITH LUMINESCENT SAND IN GROIN FIELDS	6008GR0001
THE HISTORY OF THE DUTCH COAST IN THE LAST CENTURY	6504GR0001
MARITIME AND RIPARIAN USE OF GABIONS	6306GR0002
SCALE EFFECTS IN MODELS WITH LITTORAL SAND DRIFT	6000GR0001
EMERGENCY METHODS TO COMBAT BEACH EROSION	5905GR0001
EMERGENCY MEASURES TO COMBAT BEACH EROSION	6105GR0001
COAST EROSION AND DEFENCE	6112GR0001
BEHAVIOR OF SAND ASPHALT GROINS AT OCEAN CITY MARYLAND	6010GR0002
OCEANOGRAPHICAL ENGINEERING	6310GR0001
GROINS ON THE SHORE OF THE GREAT LAKES	6206GR0001
THE SELSEY COAST PROTECTION SCHEME	6207GR0001
COASTAL PROTECTION IN MASSACHUSETTS	
COASTAL PROTECTION FOR FLORIDA	
A MODEL STUDY OF THE BEHAVIOR OF BEACHES AND GROYNES	
THE NEARSHORE MOVEMENT OF SAND AT DURRIN	

A STUDY OF GROINS AND THEIR FUNCTION AS HYDRAULIC STRUCTURES

HOW TO BUILD A BEACH AT ECONOMY PRICES

FUNDAMENTALS OF COAST EROSION AND DEFENCE

AN EXPERIMENTAL STUDY ON THE EFFECT OF COASTAL GROINS

INFORMATION ON BEACH PROTECTION IN FLORIDA

COAST EROSION AND THE DEVELOPMENT OF BEACH PROFILES

ARRANGEMENT OF GROINS ON A SANDY BEACH

SOME COASTAL ENGINEERING PROBLEMS IN INDIA

FUNCTIONS OF GROINS-FUNDAMENTAL STUDY ON BEACH SEDIMENT AFFECTED BY GROINS (1)

ART OF BEACH PROTECTION

REPORT TO THE 17TH INTERNATIONAL NAVIGATION CONGRESS

BEACH PROTECTION MEASURES

WAVE ACTION ON BEACHES

THE ACTION OF GROINS ON BEACH STABILIZATION

REPORT TO THE 17TH INTERNATIONAL NAVIGATION CONGRESS

BEACH PROTECTION MEASURES

ALL STEEL GROINE - MIAMI BEACH

THE PROBLEM OF COAST EROSION

WINDS WAVES AND MARITIME STRUCTURES

SUMMARY REPORT ON STUDIES OF SAND TRANSPORTATION BY WAVE ACTION

PERMEABLE GROINS AT KENOSHA WISCONSIN

THE PROTECTION AND IMPROVEMENT OF FORESHORES BY THE UTILIZATION OF TIDAL AND WAVE ACTION

EROSION OF OUR COASTAL FRONTIERS

ROUND-TABLE DISCUSSION

BEACH EROSION STUDIES

JETTY

EFFECTIVENESS OF GROINS AT ROCKAWAY BEACH LONG ISLAND NEW YORK

ART OF FORMING PROTECTIVE BEACHES

JETTY

A NEW METHOD OF CONSTRUCTION IN COAST EROSION CONTROL

SHORE PROTECTION BY PERMEABLE GROINS

CONEY ISLAND PUBLIC BEACH AND BOARDWALK IMPROVEMENT

SHOREWOOD PROTECTS ITS LAKE FRONT

REPORT OF THE FORESHORE EROSION BOARD

REPORT OF ADVISORY BOARD ON BEACH PROTECTION LOS ANGELES COUNTY

THE NORTH SHORE VERSUS LAKE MICHIGAN

SHOALING

A STUDY OF GROINS AND THEIR FUNCTION AS HYDRAULIC STRUCTURES

COAST PROTECTION ON THE NORTH SEA COASTS OF HOLLAND FRANCE BELGIUM AND GERMANY

SHORT

THE CREATION OF AN ARTIFICIAL BEACH IN LARVOTTO BAY MONTE CARLO PRINCIPALITY OF MONACO

EXPERIMENTAL STUDY OF THE HYDRAULIC BEHAVIOR OF GROINE SYSTEMS

SHORE PROTECTION ON THE COAST OF YAUZU

EXPERIMENT IN SHORE PROTECTION

VARIATIONS IN GROIN DESIGN

USE OF LONG GROINS AS ARTIFICIAL HEADLANDS

VARIATIONS IN GROIN DESIGN

SHORELINE ADVANCEMENT BY SEA WALL AND GROYNES AT COCHIN

PERMEABLE AND SEMIPERMEABLE GROINS FROM OHIO ON LAKE ERIE

STABILITY OF BEACHES USING GROINS

A PICTORIAL HISTORY OF SELECTED STRUCTURES ALONG THE NEW JERSEY COAST

ASPHALT GROINS

COAST PROTECTION - GROINE SYSTEMS

COASTAL PROTECTION IN MASSACHUSETTS

A MODEL STUDY OF THE BEHAVIOR OF BEACHES AND GROYNES

GROINS FROM WISCONSIN ON LAKE MICHIGAN

6107GR0001
5509GR0001
5409GR0001
5810GR0001
5210GR0008
5406GR0001
5609GR0001
5712GR0002
5706GR0002
4510GR0001
4900GR0004
4206GR0001
4804GR0001
4906GR0005
4210GR0001
4910GR0002
4700GR0001
5000GR0001
5201GR0001
4001GR0001
0306GR0001
3804GR0001
3604GR0001
3901GR0001
3711GR0001
3812GR0001
3505GR0001
3505GR0001
3507GR0001
3907GR0001
2300GR0001
3807GR0004
3612GR0001
3012GR0001
3011GR0001
6107GR0001
3703GR0001
6809GR0004
6809GR0003
6609GR0002
7105GR0001
6510GR0001
6510GR0002
6705GR0001
6008GR0003
6500GR0003
8406GR0001
8410GR0001
8204GR0001
6204GR0004
6010GR0002
6206GR0001
6500GR0001

SHORT

(CONTINUED)

GOINS ON THE SHORES OF THE GREAT LAKES
 COASTAL ENGINEERING STRUCTURES
 COASTAL PROTECTION WORKS AND RELATED PROBLEMS IN JAPAN
 A STUDY OF GOINS AND THEIR FUNCTION AS HYDRAULIC STRUCTURES
 PERMEABLE GOINS FROM ILLINOIS ON LAKE MICHIGAN
 ASPHALT IN BEACH EROSION CONTROL STRUCTURES
 COAST EROSION AND DEFENCE
 STABILIZATION OF SINGLE ALLUVIAL SHORES BY GOINS OF FULL PROFILE
 COAST PROTECTION SOME RECENT WORKS ON THE EAST COAST 1942-52
 COASTAL ENGINEERING STUDY AT POMPANO BEACH
 ARRANGEMENT OF GOINS ON A SANDY BEACH
 PROTECTING OUR SHORE LINE
 FUNDAMENTALS OF COAST EROSION AND DEFENCE
 SOME ASPECTS OF SHORE PROTECTION IN HONOLULU HARBOR
 BEACH EROSION CONTROL GRAND ISLE LOUISIANA
 COAST EROSION
 LITTORAL PROCESSES ON SANDY COASTS
 PAPER ON PROTECTIVE WORKS ADAPTED TO LIMIT EROSION ALONG THE OPEN COAST HOW THEY WORK
 EROSION OF OUR COASTAL FRONTIERS - PART II
 SCATTERED GOINS
 THE PROBLEM OF COAST EROSION
 COAST EROSION AND PROTECTION - STUDIES IN CAUSES AND REMEDIES
 PERMEABLE GOINS AT KENOSHA WISCONSIN
 SHORE PROTECTION METHODS AND MATERIALS
 COAST PROTECTION
 EROSION OF OUR COASTAL FRONTIERS
 GROYNES
 EFFECTIVENESS OF PERMEABLE TYPE GOINS USED FOR BEACH PROTECTION AT SHOREWOOD WISCONSIN AND OTHER CITIES ALONG THE WEST SHORE OF LAKE MICHIGAN
 CERTAIN POINTS ABOUT EROSION COSTS AND MEASURES OF PROTECTION
 EARLY ATTEMPTS AT INLET CONSTRUCTION ON THE FLORIDA EAST COAST
 INVESTIGATIONS OF STEEL SHEET PILING
 THE NORTH SHORE VERSUS LAKE MICHIGAN
 REPORT TO THE 15TH INTERNATIONAL NAVIGATION CONGRESS
 REPORT OF ADVISORY BOARD ON BEACH PROTECTION LOS ANGELES COUNTY
 CALIFORNIA'S BEACH EROSION AND DEVELOPMENT PROBLEMS
 SINGLE
 THE DYNAMICS OF A COAST WITH A GROYNES SYSTEM
 COASTAL PROCESSES
 USE OF LONG GROINS AS ARTIFICIAL HEADLANDS
 SOME SAND TRANSPORT PHENOMENA ON COASTS WITH HARDS
 EXPERIMENT IN SHORE PROTECTION
 VARIATIONS IN GROIN DESIGN
 DUBAI CREEK ENTRANCE
 A PICTORIAL HISTORY OF SELECTED STRUCTURES ALONG THE NEW JERSEY COAST
 USE OF CONCRETE FOR SHORE PROTECTION
 AERIAL PHOTOGRAPHS OF WALLIS SAND STATE BEACH RYE NEW HAMPSHIRE
 PERMEABLE GOINS FROM ILLINOIS ON LAKE MICHIGAN
 VARIATIONS IN GROIN DESIGN
 COASTAL ENGINEERING STRUCTURES
 DESIGN AND CONSTRUCTION OF THE SEAL BEACH GROIN
 BEHAVIOR OF BEACH FILLS IN NEW ENGLAND
 REPORT TO THE 21ST INTERNATIONAL NAVIGATION CONGRESS
 A STUDY OF GOINS AND THEIR FUNCTION AS HYDRAULIC STRUCTURES
 BEHAVIOR OF BEACH FILLS IN NEW ENGLAND
 INFORMATION ON BEACH PROTECTION IN FLORIDA

6111GR0001
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 7009GR0002
 7105GR0001
 6705GR0001
 6809GR0008
 6410GR0001
 6204GR0002
 6306GR0001
 6500GR0002
 6510GR0001
 6307GR0001
 6102GR0001
 6500GR0004
 6107GR0001
 6200GR0002
 5210GR0003

SINGLE

(CONTINUED)

AN EXPERIMENTAL STUDY ON THE EFFECT OF COASTAL GROINS
 COASTAL PROTECTION REVIEW OF METHODS FOR DEFENCE
 PHOTOGRAPHS OF SASCO HILL BEACH FAIRFIELD CONNECTICUT AFTER GROIN CONSTRUCTION AND BEFORE FILL PLACEMENT
 CONCRETE SHORE PROTECTION
 PHOTOGRAPHS OF CUMPO BEACH WESTPORT CONNECTICUT AFTER GROIN CONSTRUCTION AND BEFORE FILL PLACEMENT
 MOTION OF SAND PARTICLES BETWEEN GROINS
 FUNDAMENTALS OF COAST EROSION AND DEFENCE
 ARRANGEMENT OF GROINS ON A SANDY BEACH
 SCATTERED GROINS
 COAST EROSION AND PROTECTION - STUDIES IN CAUSES AND REMEDIES
 APPLICATION OF ASPHALT IN HYDRAULIC ENGINEERING WORKS
 REPORT ON ST. SIMON ISLAND STUDIES
 RECENT STORM DAMAGE ALONG THE COASTS OF FLORIDA AND MISSISSIPPI
 REPORT TO THE 17TH INTERNATIONAL NAVIGATION CONGRESS
 COAST PROTECTION
 THE ACTION OF GROINS ON BEACH STABILIZATION
 INFLUENCE OF GROINS ON BEACH STABILIZATION
 PAPER ON PROTECTIVE WORKS ADAPTED TO LIMIT EROSION ALONG THE OPEN COAST HOW THEY WORK
 SUMMARY REPORT ON STUDIES OF SAND TRANSPORTATION BY WAVE ACTION
 ALL STEEL GROYNES - MIAMI BEACH
 PROTECTION OF COASTS AGAINST THE SEA WITH OR WITHOUT PREPONDERATING COASTAL DRIFT OF MATERIALS
 SAND MOVEMENT AND BEACH EROSION
 REPORT OF ADVISORY BOARD ON BEACH PROTECTION LOS ANGELES COUNTY
 REPORT TO THE 15TH INTERNATIONAL NAVIGATION CONGRESS
 REPORT TO THE 15TH INTERNATIONAL NAVIGATION CONGRESS
 REPORT ON EROSION AT MANASQUAN INLET NEW JERSEY AND ADJACENT BEACHES
 THE NORTH SHORE VERSUS LAKE MICHIGAN
 EROSION AND PALMETTO GROINS AT NORTH POINT ST. AUGUSTINE FLORIDA
 PROTECTING GALVESTON BEACH

SPUR

COASTAL PROTECTION IN MASSACHUSETTS

COAST EROSION AND PROTECTION - STUDIES IN CAUSES AND REMEDIES

STEEL

CHARACTERISTICS OF SHINGLE BEACHES: THE SOLUTION TO SOME PRACTICAL PROBLEMS

VARIATIONS IN GROIN DESIGN

DUBAI CREEK ENTRANCE

SHORE PROTECTION PLANNING AND DESIGN

COASTAL PROCESSES

SHEET STEEL PILING FOR SHORE PROTECTION STRUCTURES

REVIEW OF GERMAN EXPERIENCE ON COASTAL PROTECTION BY GROINS

GROINS ON THE SHORE OF THE GREAT LAKES

A CONTRACTOR BATTLES THE TIDES

PERMEABLE AND SEMIPERMEABLE GROINS FROM OHIO ON LAKE ERIE

VARIATIONS IN GROIN DESIGN

GROINS FROM WISCONSIN ON LAKE MICHIGAN

A PICTORIAL HISTORY OF SELECTED STRUCTURES ALONG THE NEW JERSEY COAST

PERMEABLE GROINS FROM ILLINOIS ON LAKE MICHIGAN

COASTAL ENGINEERING STRUCTURES

COAST PROTECTION SOME RECENT WORKS ON THE EAST COAST 1942-52

BETTER BETTY FOR LESS MONEY

LAKE MICHIGAN EROSION STUDIES

DIVISION OF SHORE EROSION - OHIO

FEEDER BEACHES AND GROINS RESTORE PRESQUE ISLE PENINSULA

FUNDAMENTALS OF COAST EROSION AND DEFENCE

TIMBER IN THE CONSTRUCTION OF SEA DEFENCE AND RIVER WORKS

INFORMATION ON BEACH PROTECTION IN FLORIDA

5810GR0001
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 5210GR0008

STEEL

(CONTINUED)

FILLING PATTERN OF THE FORT SHERIDAN GROIN SYSTEM

BEACH PROTECTION MEASURES

LIFE OF STEEL SHEET PILE STRUCTURES IN ATLANTIC COASTAL STATES

EROSION PROBLEMS ON THE OHIO SHORE OF LAKE ERIE

ALL STEEL GROIN - MIAMI BEACH

ART OF BEACH PROTECTION

REPORT ON ST. SIMON ISLAND STUDIES

REPORT TO THE 17TH INTERNATIONAL NAVIGATION CONGRESS

DURABILITY OF STEEL SHEET PILING IN SHORE STRUCTURES

DESIGN AND CONSTRUCTION OF GROINS

DETERIORATION OF STEEL SHEET PILE GROINS AT PALM BEACH FLORIDA

REPORT TO THE 17TH INTERNATIONAL NAVIGATION CONGRESS

PAPER ON PROTECTIVE WORKS ADAPTED TO LIMIT EROSION ALONG THE OPEN COAST HOW THEY WORK

EXPERIMENTAL STEEL SHEET PILE GROINS PALM BEACH FLORIDA

BEACH PROTECTION ENGINEERS ATTEMPT TO OUTWIT NATURE AT PRESQUE ISLE PENINSULA

REPORT TO THE 17TH INTERNATIONAL NAVIGATION CONGRESS

BEACH PROTECTION MEASURES

STEEL SHEET PILING FOR SHORE AND BEACH PROTECTION STRUCTURES

CASE HISTORY OF SHORE PROTECTION AT PRESQUE ISLE PENINSULA PENNSYLVANIA

GALVESTON ISLAND SHORELINE AND THE PROTECTION OF GALVESTON BEACH

ROUND-TABLE DISCUSSION OF SHORE PROBLEMS IN RELATION TO RECREATION

JETTY

JETTY

ROUND-TABLE DISCUSSION

REPORT ON BEACH EROSION AT HOLLYWOOD BEACH FLORIDA

DIE SCHUTZBAUTEN AUF DER INSEL ROKKUM

MESH JETTIES

THE WOSENITZ PRECAST PERMEABLE GROIN

INVESTIGATIONS OF STEEL SHEET PILING

PROTECTING GALVESTON BEACH

SOME DATA ON BEACH PROTECTION WORKS

BEACH EROSION STUDIES

EFFECTIVENESS OF PERMEABLE TYPE GROINS USED FOR BEACH PROTECTION AT SHOREWOOD WISCONSIN AND OTHER CITIES ALONG T

THE WEST SHORE OF LAKE MICHIGAN

REPORT OF ADVISORY BOARD ON BEACH PROTECTION LOS ANGELES COUNTY

THE NORTH SHORE VERSUS LAKE MICHIGAN

SEA DEFENCE EROSION AND PROTECTION ON A SANDY COAST

CALIFORNIA BEACH EROSION AND DEVELOPMENT PROBLEMS

BEACH EROSION STUDIES

SEA WALLS AND GROINS OF STEEL SHEETING STABILIZE MIAMI BEACH

STRUCTURAL-DESIGN

LAND RECLAMATION AND GROIN-BUILDING IN THE TIDAL FLATS

SHORE PROTECTION PLANNING AND DESIGN

CLIFF DRAINAGE AND BEACH DISTRIBUTION

MARITIME AND RIPARIAN USE OF GABIONS

SOME SAND TRANSPORT PHENOMENA ON COASTS WITH BARS

VARIATIONS IN GROIN DESIGN

BEACH BEHAVIOR NORTH SHORE LONG ISLAND SOUND

GROINS ON THE SHORE OF THE GREAT LAKES

USE OF CONCRETE FOR SHORE PROTECTION

STABILIZATION OF SHINGLE ALLUVIAL SHORES BY GROINS OF FULL PROFILE

PERMEABLE AND SEMIPERMEABLE GROINS FROM OHIO ON LAKE ERIE

COASTAL ENGINEERING STRUCTURES

BEACH EROSION AND PROTECTION WORKS IN IMAZU-SAKANO BEACH

COASTAL PROTECTION PROCEDURES WITH SPECIAL REFERENCE TO CONDITIONS IN FLORIDA

ASPHALT IN BEACH EROSION CONTROL STRUCTURES

5310GR0003
4210GR0001
5210GR0002
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6204GR0003

STRUCTURAL-DESIGN (CONTINUED)

A STUDY OF GROINS AND THEIR FUNCTION AS HYDRAULIC STRUCTURES
 NEW COASTAL WORKS AT NAHARIYA (ISHAEL I
 GEOGRAPHICAL ENGINEERING
 PERMEABLE GROINS FROM ILLINOIS ON LAKE MICHIGAN
 COASTAL PROTECTION FOR FLORIDA
 DESIGN AND CONSTRUCTION OF THE SEAL BEACH GROIN
 GROINS FROM WISCONSIN ON LAKE MICHIGAN
 THE SELSEY COAST PROTECTION SCHEME -
 SHEET PILING FOR SHORE PROTECTION STRUCTURES
 A MODEL STUDY OF THE BEHAVIOR OF BEACHES AND GROYNES
 COAST PROTECTION - GROYNES SYSTEMS
 ASPHALT GROINS

VARIATIONS IN GROIN DESIGN
 UNFINISHED BUSINESS NEW JERSEY GROIN PROJECT STALLED BY WINTER
 COAST EROSION AND THE DEVELOPMENT OF BEACH PROFILES
 TIMBER IN THE CONSTRUCTION OF SEA DEFENCE AND RIVER WORKS
 CONCRETE SHORE PROTECTION
 EXPERIMENTAL GROINS CAMP PERRY OHIO
 FUNDAMENTALS OF COAST EROSION AND DEFENCE
 ARRANGEMENT OF GROINS ON A SANDY BEACH
 PRECAST CONCRETE BLOCK GROINS
 LOW COST SHORE PROTECTION USED ON THE GREAT LAKES
 COAST PROTECTION SOME RECENT WORKS ON THE EAST COAST 1942-52
 BEHAVIOR OF SAND ASPHALT GROINS AT OCEAN CITY MARYLAND
 THE FERNANDINA BEACH GROINS
 ASPHALT GROINS AND JETTIES

RITUMEN IN COASTAL ENGINEERING

HOW TO BUILD A BEACH AT ECONOMY PRICES

SUMMARY STATEMENT CONCERNING IMPORTANCE OF A GROIN DESIGN CRITERION

CURVED GROINS AND FORESHORE DEFENCE

THE ASPHALT GROINS AT OCEAN CITY MARYLAND

REPORT TO THE 14TH INTERNATIONAL NAVIGATION CONGRESS

SOME COASTAL ENGINEERING PROBLEMS IN INDIA

FLORIDA COASTAL PROBLEMS

COASTAL DEVELOPMENT AND COASTAL PROTECTION

SHORE PROTECTION METHODS AND MATERIALS

EROSION PROBLEMS ON THE OHIO SHORE OF LAKE ERIE

STEEL SHEET PILING FOR SHORE AND BEACH PROTECTION STRUCTURES

THE PREVENTION OF COAST EROSION

PAPER ON PROTECTIVE WORKS ADAPTED TO LIMIT EROSION ALONG THE OPEN COAST HOW THEY WORK

SOME SEA DEFENCE WORKS FOR RECLAIMED LANDS

REPORT TO THE 17TH INTERNATIONAL NAVIGATION CONGRESS

COAST EROSION IN GREAT BRITAIN

PIERS AND JETTIES OF PRECAST CONCRETE

CONCRETE BLOCKS FORM LOW-COST GROINS

WINDS WAVES AND MARITIME STRUCTURES

COAST EROSION

INFORMATION ON BEACH PROTECTION IN FLORIDA

APPLICATION OF ASPHALT IN HYDRAULIC ENGINEERING WORKS

ART OF BEACH PROTECTION

THE PROBLEM OF COAST EROSION

PERMEABLE JETTIES BUILT TO PROTECT CLEVELANDS SHORE

BEACH PROTECTION MEASURES

COAST EROSION AND PROTECTION - STUDIES IN CAUSES AND REMEDIES

LAKE MICHIGAN EROSION STUDIES

EXPERIMENTAL STEEL SHEET PILE GROINS PALM BEACH FLORIDA

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 4210GR0001
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 4800GR0001

STRUCTURAL-DESIGN (CONTINUED)	5008GR0001
THE DANISH WESTCOAST - LITTORAL DRIFT PROBLEMS AND MEASURES AGAINST COAST EROSION	4910GR0002
ALL STEEL GROINE - MIAMI BEACH	4904GR0001
COAST PROTECTION	5210GR0001
MEASURES AGAINST EROSION AT GROINS AND JETTIES	4910GR0001
DETERIORATION OF STEEL SHEET PILE GROINS AT PALM BEACH FLORIDA	5010GR0001
DESIGN AND CONSTRUCTION OF GROINS	3105GR0001
SEA WALLS AND GROINS OF STEEL SHEETING STABILIZE MIAMI BEACH	3807GR0005
PROTECTING GALVESTON BEACH	3711GR0001
JETTY	3202GR0001
PROTECTION OF COASTS AGAINST THE SEA WITH OR WITHOUT PREPONDERATING COASTAL DRIFT OF MATERIALS	3012GR0001
REPORT OF ADVISORY BOARD ON BEACH PROTECTION LOS ANGELES COUNTY	4000GR0002
BEACH EROSION STUDIES	3907GR0000
SHORE PROTECTION BY PERMEABLE GROINS	3100GR0002
REPORT TO THE 15TH INTERNATIONAL NAVIGATION CONGRESS	3807GR0003
SHORE PROTECTIVE WORK AT WINTHROP MASSACHUSETTS	2712GR0001
SEA DEFENCE EROSION AND PROTECTION ON A SANDY COAST	4001GR0002
CURVED JETTIES SEA WALLS BULKHEADS AND RETAINING WALLS	2300GR0001
CONVEY ISLAND PUBLIC BEACH AND BOARDWALK IMPROVEMENT	3806GR0001
SHORE PROTECTIVE WORK AT WINTHROP MASSACHUSETTS	3901GR0001
BEACH EROSION STUDIES	0000GR0005
THE WUSENITZ PRECAST PERMEABLE GROIN	0000GR0009
MAN AGAINST THE SEA A GUIDE TO EROSION CONTROL	0306GR0001
THE PROTECTION AND IMPROVEMENT OF FORESHORES BY THE UTILIZATION OF TIDAL AND WAVE ACTION	3801GR0001
REPORT ON BEACH EROSION AT HOLLYWOOD BEACH FLORIDA	0800GR0001
COAST EROSION AND FORESHORE PROTECTION	1509GR0001
COAST EROSION AND PROTECTION ON LONG ISLAND AND NEW JERSEY	3607GR0002
INVESTIGATIONS OF STEEL SHEET PILING	3602GR0001
MESH JETTIES	3512GR0001
DIE SCHUTZHAUTEN AUF DER INSEL BORKUM	3610GR0002
CONSTRUCTION AND MAINTENANCE OF THE PUBLIC BEACH AT ROCKAWAY BEACH BOROUGH OF QUEENS	3610GR0001
CALIFORNIA'S BEACH EROSION AND DEVELOPMENT PROBLEMS	3505GR0001
JETTY	3807GR0004
SHOREWOOD PROTECTS ITS LAKE FRONT	3505GR0002
JETTY	3807GR0002
GALVESTON ISLAND SHORELINE AND THE PROTECTION OF GALVESTON BEACH	3309GR0001
ART OF FORMING PROTECTIVE BEACHES	3306GR0001
DU-PLAT-TAYLOR ADJUSTABLE SCREW PILE GROYNES	3911GR0001
SOME DATA ON BEACH PROTECTION WORKS	3400GR0001
EFFECTIVENESS OF PERMEABLE TYPE GROINS USED FOR BEACH PROTECTION AT SHOREWOOD WISCONSIN AND OTHER CITIES ALONG THE WEST SHORE OF LAKE MICHIGAN	4010GR0001
GROYNES	3703GR0001
EROSION CONTROL AT WRIGHTSVILLE BEACH	6606GR0002
COAST PROTECTION ON THE NORTH SEA COASTS OF HOLLAND FRANCE BELGIUM AND GERMANY	7009GR0003
SYSTEM	7000GR0003
SHORE PROTECTION PLANNING AND DESIGN	6809GR0005
EXPERIMENTAL STUDY OF THE HYDRAULIC BEHAVIOR OF INCLINED GROINE SYSTEMS	6900GR0004
COASTAL DEFENCE WORKS	7009GR0006
MODEL STUDIES IN SITU OBSERVATIONS	6609GR0002
THE TERMINAL PROBLEM IN COAST PROTECTION	7011GR0001
REPORT TO THE 22ND INTERNATIONAL NAVIGATION CONGRESS	7009GR0005
CHARACTERISTICS OF SHINGLE BEACHES: THE SOLUTION TO SOME PRACTICAL PROBLEMS	7009GR0005
SHORE PROTECTION ON THE COAST OF YAIZU	7009GR0005
BEACH BEHAVIOR NORTH SHORE LONG ISLAND SOUND	7009GR0005
THE EFFECT OF GROYNES ON ERODED BEACHES	6809GR0004
THE CREATION OF AN ARTIFICIAL BEACH IN LARVOTTO BAY MONTE CARLO PRINCIPALITY OF MONACO	

EFFECT OF PARTICLE SIZE AND DISTRIBUTION ON STABILITY OF ARTIFICIALLY FILLED BEACH PRESQUE ISLE PENINSULA

PENNSYLVANIA	6805GR0001
CLIFF DRAINAGE AND BEACH DISTRIBUTION	6809GR0006
EXPERIMENTAL STUDY OF THE HYDRAULIC BEHAVIOR OF GROINE SYSTEMS	6809GR0003
BEACH EROSION CONTROL IN NEW ENGLAND	6910GR0001
VARIATIONS IN GROIN DESIGN	6705GR0001
SOME SAND TRANSPORT PHENOMENA ON COASTS WITH BARS	7009GR0002
THE ATLANTIC COAST OF LONG ISLAND	6809GR0007
THE HISTORY OF THE DUTCH COAST IN THE LAST CENTURY	7009GR0001
THE DYNAMICS OF A COAST WITH A GROINE SYSTEM	7009GR0008
THE DYNAMICS OF A COAST WITH A GROINE SYSTEM	6809GR0001
NEW COASTAL WORKS AT NAHARIYA (ISRAEL)	6502GR0001
BEHAVIOR OF BEACH FILLS IN NEW ENGLAND	6102GR0001
REVIEW OF GERMAN EXPERIENCE ON COASTAL PROTECTION BY GROINS	6307GR0002
STUDY OF EROSION ALONG HOMER SPIIT AND VICINITY KACHEMAK BAY ALASKA	6511GR0001
THE NEARSHORE MOVEMENT OF SAND AT DURBIN	6207GR0001
A MODEL STUDY OF THE BEHAVIOR OF BEACHES AND GROYNES	6206GR0001
STRUCTURES FOR SHORE PROTECTION	6307GR0003
LITTORAL PROCESSES AND THE DEVELOPMENT OF SHORELINES	6510GR0004
THE PROTECTION AND PRESERVATION OF THE ATLANTIC SHORE FRONT OF THE STATE OF NEW YORK	6207GR0002
A STUDY OF GROINS AND THEIR FUNCTION AS HYDRAULIC STRUCTURES	6107GR0001
BEHAVIOR OF BEACH FILLS IN NEW ENGLAND	6200GR0002
COASTAL PROTECTION FOR FLORIDA	6310GR0001
REVIEW OF BEACH EROSION AND STORM TIDE CONDITIONS IN FLORIDA 1961-1962	6211GR0001
SEA GROINS EFFECTIVENESS INVESTIGATIONS BY DYED SAND TESTS	6600GR0001
GROINS ON THE SHORE OF THE GREAT LAKES	6105GR0001
COAST PROTECTION - GROINE SYSTEMS	6204GR0004
THE SELSEY COAST PROTECTION SCHEME	6112GR0001
AERIAL PHOTOGRAPHS PLUM ISLAND MASSACHUSETTS	6208GR0001
A PICTORIAL HISTORY OF SELECTED STRUCTURES ALONG THE NEW JERSEY COAST	6410GR0001
PERMEABLE GROINS FROM ILLINOIS ON LAKE MICHIGAN	6500GR0002
USE OF LONG GROINS AS ARTIFICIAL HEADLANDS	6510GR0002
GROINS FROM WISCONSIN ON LAKE MICHIGAN	6503GR0001
BEACH REHABILITATION BY USE OF BEACH FILLS AND FURTHER PLANS FOR THE PROTECTION OF THE ISLAND OF NORDERNEY	6008GR0005
PERMEABLE AND SEMIPERMEABLE GROINS FROM OHIO ON LAKE ERIE	6500GR0003
COASTAL ENGINEERING STRUCTURES	6307GR0001
BEHAVIOR OF BEACH FILL AND BORROW AREA AT PROSPECT BEACH WEST HAVEN CONNECTICUT	6108GR0001
STABILIZATION OF SINGLE ALLUVIAL SHORES BY GROINS OF FULL PROFILE	6400GR0001
BEACH EROSION AND PROTECTION WORKS IN IMAZU-SAKANO BEACH	6112GR0002
COASTAL PROCESSES	6606GR0001
VARIATIONS IN GROIN DESIGN	5812GR0002
PROTECTING OUR SHORE LINE	5812GR0001
FLORIDA COASTAL PROBLEMS	5712GR0001
DIVISION OF SHORE EROSION - OHIO	5510GR0002
COASTAL DEVELOPMENT AND COASTAL PROTECTION	5511GR0001
FILLING PATTERN OF THE FORT SHERIDAN GROIN SYSTEM	5310GR0003
FUNDAMENTALS OF COAST EROSION AND DEFENCE	5409GR0001
A CONTRACTOR BATTLES THE TIDES	6004GR0001
SOME COASTAL ENGINEERING PROBLEMS IN INDIA	5712GR0002
LABORATORY STUDY OF THE EFFECT OF GROINS ON THE RATE OF LITTORAL TRANSPORT EQUIPMENT DEVELOPMENT AND INITIAL ESTS	5906GR0001
BASIC COASTAL MODEL	5800GR0004
INTERIM REPORT ON ASPHALT GROINS AT OCEAN CITY MARYLAND	5607GR0001
ASPHALT GROINS - TWO YEAR PLAN	5708GR0001
COAST EROSION AND THE DEVELOPMENT OF BEACH PROFILES	5406GR0001
CONCRETE SHORE PROTECTION	5500GR0001

SYSTEM	6000GR0001
COAST EROSION AND DEFENCE	5803GR0001
FEDER BEACHES AND GROINS RESTORE PRESQUE ISLE PENINSULA	5510GR0001
MARYLANDS FAVORITE BEACH AT OCEAN CITY	5900GR0004
PRECEDING OF SHORELINE AT COCHIN BY GROYNES AND A SEAWALL	5509GR0001
HOW TO BUILD A BEACH AT ECONOMY PRICES	5609GR0001
ARRANGEMENT OF GROINS ON A SANDY BEACH	5903GR0003
GENERALITIES ON COASTAL PROCESSES AND PROTECTION	5812GR0001
MOTION OF SAND PARTICLES BETWEEN GROINS	5810GR0001
AN EXPERIMENTAL STUDY ON THE EFFECT OF COASTAL GROINS	6008GR0002
PROTECTION WORKS ON THE MEXICAN COAST THE CREATION OF BEACHES AND DUNES	5701GR0001
COASTAL PROTECTION REVIEW OF METHODS FOR DEFENCE	5311GR0001
COASTAL PROTECTION SOME RECENT WORKS ON THE EAST COAST 1942-52	5306GR0001
BEHAVIOR OF SAND ASPHALT GROINS AT OCEAN CITY MARYLAND	5905GR0001
OBSERVATIONS ON THE TRAVEL OF SHORE MATERIAL ALONG A CHALK FORESHORE	5409GR0005
BEACH EROSION CONTROL GRAND ISLE LOUISIANA	5604GR0001
BEHAVIOR OF BEACH FILL AT OCEAN CITY NEW JERSEY	5602GR0001
SHORELINE ADVANCEMENT BY SEA WALL AND GROYNES AT COCHIN	6008GR0003
DEVELOPMENT OF THE NEW JERSEY SHORE	5210GR0005
EROSION PROBLEMS ON THE OHIO SHORE OF LAKE ERIE	5204GR0001
COAST EROSION AND PROTECTION - STUDIES IN CAUSES AND REMEDIES	5200GR0002
COAST PROTECTION	4904GR0001
COAST PROTECTION METHODS AND MATERIALS	4410GR0002
CASE HISTORY OF SHORE PROTECTION AT PRESQUE ISLE PENINSULA PENNSYLVANIA	5210GR0003
REPORT TO THE 17TH INTERNATIONAL NAVIGATION CONGRESS	4900GR0003
DETERIORATION OF STEEL SHEET PILE GROINS AT PALM BEACH FLORIDA	4910GR0001
DESIGN AND CONSTRUCTION OF GROINS	5010GR0001
APPLICATION OF ASPHALT IN HYDRAULIC ENGINEERING WORKS	5101GR0001
THE DANISH WESTCOAST - LITTORAL DRIFT PROBLEMS AND MEASURES AGAINST COAST EROSION	5008GR0001
REPORT TO THE 17TH INTERNATIONAL NAVIGATION CONGRESS	4900GR0004
COAST EROSION IN GREAT BRITAIN	4204GR0001
INFORMATION ON BEACH PROTECTION IN FLORIDA	5210GR0008
EXPERIMENTAL STEEL SHEET PILE GROINS PALM BEACH FLORIDA	4800GR0001
REPORT TO THE 17TH INTERNATIONAL NAVIGATION CONGRESS	4900GR0001
SOME ASPECTS OF SHORE PROTECTION IN BOSTON HARBOR	5210GR0004
BEACH PROTECTION ENGINEERS ATTEMPT TO OUTWIT NATURE AT PRESQUE ISLE PENINSULA	5109GR0001
SUMMARY REPORT ON STUDIES OF SAND TRANSPORTATION BY WAVE ACTION	5201GR0001
SOME SEA DEFENCE WORKS FOR RECLAIMED LANDS	4602GR0001
PAPER ON PROTECTIVE WORKS ADAPTED TO LIMIT	4806GR0001
EROSION OF OUR COASTAL FRONTIERS - PART II	4405GR0001
BEACH PROTECTION MEASURES	4206GR0001
SUMMARY REPORT ON STUDIES OF SAND TRANSPORTATION BY WAVE ACTION	5201GR0001
SCATTERED GROINS	5009GR0001
CONCRETE BLOCKS FORM LOW-COST GROINS	5204GR0002
INFLUENCE OF GROINS ON BEACH STABILIZATION	5101GR0002
COAST EROSION	5000GR0003
GROYNES	3400GR0001
REPORT ON BEACH EROSION AT HOLLYWOOD BEACH FLORIDA	3801GR0001
BEACH EROSION STUDIES	3901GR0001
ART OF FORMING PROTECTIVE BEACHES	3309GR0001
BEACH EROSION STUDIES	4000GR0002
SHOREWOOD PROTECTS ITS LAKE FRONT	3807GR0004
REPORT ON SHORE EROSION AT TILGHMAN POINT MARYLAND	4006GR0001
CONSTRUCTION AND MAINTENANCE OF THE PUBLIC BEACH AT ROCKAWAY BEACH BOROUGH OF QUEENS	3610GR0002
ROUND-TABLE DISCUSSION OF SHORE PROBLEMS IN RELATION TO RECREATION	3710GR0001

EFFECTIVENESS OF PERMEABLE TYPE GROINS USED FOR BEACH PROTECTION AT SHOREWOOD WISCONSIN AND OTHER CITIES ALONG T

HE WEST SHORE OF LAKE MICHIGAN

DIE SCHUTZHAUTEN AUF DER INSEL HOKKUM

EROSION OF OUR COASTAL FRONTIERS

EROSION AND PALMETTO GROINS AT NORTH POINT ST. AUGUSTINE FLORIDA

REPORT ON ST. SIMON ISLAND STUDIES

ONE ASPECT OF THE DYNAMICS OF A COAST PARTLY PROTECTED BY A ROW OF GROYNES

EARLY ATTEMPTS AT INLET CONSTRUCTION ON THE FLORIDA EAST COAST

GALVESTON ISLAND SHORELINE AND THE PROTECTION OF GALVESTON BEACH

CONEY ISLAND PUBLIC BEACH AND BOARDWALK IMPROVEMENT

THE PROTECTION AND IMPROVEMENT OF FORESHORES BY THE UTILIZATION OF TIDAL AND WAVE ACTION

SOME DATA ON BEACH PROTECTION WORKS

ROUND-TABLE DISCUSSION

PROTECTING GALVESTON BEACH

JACOB RIIS PARK

THE BUDD HORIZONTALLY PERMEABLE GROIN SYSTEM FOR BEACH EROSION CONTROL AND REBUILDING SAND BEACHES

THE PREVENTION OF COAST EROSION

HAWK'S NEST BEACH CONNECTICUT

THE NORTH SHORE VERSUS LAKE MICHIGAN

GALVESTON BEACH CONSTRUCTION

COAST EROSION

INVESTIGATIONS OF STEEL SHEET PILING

REPORT ON EROSION AT MANASQUAN INLET NEW JERSEY AND ADJACENT BEACHES

TEST WITH SCALE MODELS TO DETERMINE THE EFFECT OF CURRENTS AND BREAKERS UPON A SANDY BEACH AND THE ADVANTAGEOUS

INSTALLATION OF GROINS

REPORT TO THE 15TH INTERNATIONAL NAVIGATION CONGRESS

SHORE PROTECTION BY PERMEABLE GROINS

REPORT TO THE 15TH INTERNATIONAL NAVIGATION CONGRESS

REPORT OF ADVISORY BOARD ON BEACH PROTECTION LOS ANGELES COUNTY

PROTECTION OF COASTS AGAINST THE SEA WITH OR WITHOUT PREPONDERATING COASTAL DRIFT OF MATERIALS

SAND MOVEMENT AND BEACH EROSION

S. ATLANTIC

SHORE PROTECTION EXPERIENCE IN THE UNITED STATES

VARIATIONS IN GROIN DESIGN

COASTAL PROTECTION PROCEDURES WITH SPECIAL REFERENCE TO CONDITIONS IN FLORIDA

VARIATIONS IN GROIN DESIGN

REVIEW OF BEACH EROSION AND STORM TIDE CONDITIONS IN FLORIDA 1961-1962

PHOTOGRAPHS OF SARASOTA COUNTY FLORIDA SHOWING GROIN INSTALLATION

COASTAL PROTECTION FOR FLORIDA

PHOTOGRAPHS OF FORT MACON NEAR MOREHEAD CITY NORTH CAROLINA AFTER SERIES OF HURRICANES IN 1954

THE FERNANDINA BEACH GROINS

ASPHALT GROINS AND JETTIES

FLORIDA COASTAL PROBLEMS

BETTER JETTY FOR LESS MONEY

UNFINISHED BUSINESS NEW JERSEY GROIN PROJECT STALLED BY WINTER

COASTAL DEVELOPMENT AND COASTAL PROTECTION

INFORMATION ON BEACH PROTECTION IN FLORIDA

EROSION OF OUR COASTAL FRONTIERS - PART II

LIFE OF STEEL SHEET PILE STRUCTURES IN ATLANTIC COASTAL STATES

CONCRETE SHORE PROTECTION STRUCTURES

EXPERIMENTAL STEEL SHEET PILE GROINS

DETERIORATION OF STEEL SHEET PILE GROINS AT PALM BEACH FLORIDA

BEACH PROTECTION MEASURES

RECENT STORM DAMAGE ALONG THE COASTS OF FLORIDA AND MISSISSIPPI

STEEL SHEET PILING FOR SHORE AND BEACH PROTECTION STRUCTURES

BEACH PROTECTION MEASURES

3911GR0001
3512GR0001
3804GR0001
3912GR0001
4101GR0001
0000GR0001
3807GR0001
3807GR0002
2300GR0001
0306GR0001
3605GR0001
3604GR0001
3807GR0005
3604GR0002
0000GR0006
4104GR0001
4001GR0003
3011GR0001
3604GR0003
4110GR0001
3607GR0002
3801GR0002
2806GR0001
3100GR0002
3907GR0001
3100GR0001
3012GR0001
3602GR0001
3106GR0001
6707GR0001
6705GR0001
6412GR0001
6510GR0001
6211GR0001
6200GR0001
6310GR0001
5400GR0001
5504GR0002
5511GR0002
5712GR0001
5903GR0001
5904GR0001
5511GR0001
5210GR0008
4405GR0001
5210GR0002
4410GR0003
4800GR0001
4910GR0001
4210GR0001
4801GR0001
4410GR0001
4206GR0001

S. ATLANTIC (CONTINUED)
 DURABILITY OF STEEL SHEET PILING IN SHORE STRUCTURES
 ALL STEEL GROynes - MIAMI BEACH
 EARLY ATTEMPTS AT INLET CONSTRUCTION ON THE FLORIDA EAST COAST
 SOME DATA ON BEACH PROTECTION WORKS
 SHORE EROSION AND CABBAGE PALMETTO GROINS AT NORTH POINT ST. AUGUSTINE FLORIDA
 EROSION OF OUR COASTAL FRONTIERS
 BEACH EROSION STUDIES
 THE WOSSENITZ PRECAST PERMEABLE GROIN
 THE BUDD HORIZONTALLY PERMEABLE GROIN SYSTEM FOR BEACH EROSION CONTROL AND REBUILDING SAND BEACHES
 MAN AGAINST THE SEA A GUIDE TO EROSION CONTROL
 INVESTIGATIONS OF STEEL SHEET PILING
 ROUND-TABLE DISCUSSION
 REPORT ON BEACH EROSION AT HOLLYWOOD BEACH FLORIDA
 EROSION AND PALMETTO GROINS AT NORTH POINT ST. AUGUSTINE FLORIDA
 REPORT ON ST. SIMON ISLAND STUDIES
 EROSION CONTROL AT WRIGHTSVILLE BEACH
 PARTICIPATION OF FEDERAL RELIEF AGENCIES IN BEACH PROTECTION PROJECTS
 S. M. WOOD
 VARIATIONS IN GROIN DESIGN
 GROINS ON THE SHORE OF THE GREAT LAKES
 VARIATIONS IN GROIN DESIGN
 PERMEABLE GROINS FROM ILLINOIS ON LAKE MICHIGAN
 PERMEABLE AND SEMIPERMEABLE GROINS FROM OHIO ON LAKE ERIE
 PIERS AND JETTIES OF PRECAST CONCRETE
 EROSION OF OUR COASTAL FRONTIERS - PART II
 EFFECTIVENESS OF GROINS AT ROCKAWAY BEACH LONG ISLAND NEW YORK
 MAN AGAINST THE SEA A GUIDE TO EROSION CONTROL
 THE PRINCIPLE OF INCREASING PERMEABILITY IN GROIN CONSTRUCTION
 THE NORTH SHORE VERSUS LAKE MICHIGAN
 EROSION OF OUR COASTAL FRONTIERS
 SHORE PROTECTION BY PERMEABLE GROINS
 PERMEABLE GROINS AT KENOSHA WISCONSIN
 TERMINAL
 THE TERMINAL PROBLEM IN COAST PROTECTION
 COASTAL ENGINEERING STRUCTURES
 A STUDY OF GROINS AND THEIR FUNCTION AS HYDRAULIC STRUCTURES
 THE SELSEY COAST PROTECTION SCHEME
 COAST EROSION AND THE DEVELOPMENT OF BEACH PROFILES
 FUNDAMENTALS OF COAST EROSION AND DEFENCE
 GENERALITIES ON COASTAL PROCESSES AND PROTECTION
 SOME SEA DEFENCE WORKS FOR RECLAIMED LANDS
 REPORT TO THE 17TH INTERNATIONAL NAVIGATION CONGRESS
 PROTECTION OF COASTS AGAINST THE SEA WITH OR WITHOUT PREPONDERATING COASTAL DRIFT OF MATERIALS
 TEST WITH SCALE MODELS TO DETERMINE THE EFFECT OF CURRENTS AND BREAKERS UPON A SANDY BEACH AND THE ADVANTAGEOUS
 INSTALLATION OF GROINS
 COAST EROSION IN GREAT BRITAIN
 BEACH EROSION STUDIES
 TEXAS GULF
 SHORE PROTECTION EXPERIENCE IN THE UNITED STATES
 VARIATIONS IN GROIN DESIGN
 VARIATIONS IN GROIN DESIGN
 COASTAL ENGINEERING STRUCTURES
 BEACH EROSION CONTROL GRAND ISLE LOUISIANA
 APPLICATION OF ASPHALT IN HYDRAULIC ENGINEERING WORKS
 RECENT STORM DAMAGE ALONG THE COASTS OF FLORIDA AND MISSISSIPPI

TEXAS	GULF (CONTINUED)	5210GR0002
	LIFE OF STEEL SHEET PILE STRUCTURES IN ATLANTIC COASTAL STATES	3710GR0001
	ROUND-TABLE DISCUSSION OF SHORE PROBLEMS IN RELATION TO RECREATION	3807GR0005
	PROTECTING GALVESTON BEACH	3807GR0002
	GALVESTON ISLAND SHORELINE AND THE PROTECTION OF GALVESTON BEACH	3504GR0003
	GALVESTON BEACH CONSTRUCTION	
THEORY		
	EXPERIMENTAL STUDY OF THE HYDRAULIC BEHAVIOR OF GROUYNE SYSTEMS	6809GR0003
	CHARACTERISTICS OF SHINGLE BEACHES: THE SOLUTION TO SOME PRACTICAL PROBLEMS	7009GR0006
	REPORT TO THE 22ND INTERNATIONAL NAVIGATION CONGRESS	6900GR0001
	THE DYNAMICS OF A COAST WITH A GROUYNE SYSTEM	6809GR0001
	A MATHEMATICAL THEORY ABOUT SAND WAVES AND ITS APPLICATION ON THE DUTCH WADDEN ISLE OF VLIELAND	6809GR0001
	THE DYNAMICS OF A COAST WITH A GROUYNE SYSTEM	7009GR0008
	OCEANOGRAPHICAL ENGINEERING	6400GR0003
	LITTORAL PROCESSES AND THE DEVELOPMENT OF SHORELINES	6510GR0004
	STABILITY OF BEACHES USING GROINS	6406GR0001
	COAST PROTECTION - GROUYNE SYSTEMS	6204GR0004
	A STUDY OF GROINS AND THEIR FUNCTION AS HYDRAULIC STRUCTURES	6107GR0004
	STABILIZATION OF SHINGLE ALLUVIAL SHORES BY GROINS OF FULL PROFILE	6400GR0001
	STATION OF SAND PARTICLES BETWEEN GROINS	5812GR0001
	THE DEVELOPMENT OF COAST PROFILES ON A PRECEDING COAST PROTECTED BY GROYNES	6008GR0002
	THE LONGITUDINAL STABILITY OF BEACHES	5511GR0003
	ARRANGEMENT OF GROINS ON A SANDY BEACH	5609GR0001
	COAST EROSION AND THE DEVELOPMENT OF BEACH PROFILES	5406GR0001
	THE ORIGIN AND STABILITY OF BEACHES	5712GR0003
	AN EXPERIMENTAL STUDY ON THE EFFECT OF COASTAL GROINS	5810GR0001
	SUMMARY REPORT ON STUDIES OF SAND TRANSPORTATION BY WAVE ACTION	5201GR0001
	REPORT TO THE 17TH INTERNATIONAL NAVIGATION CONGRESS	4900GR0001
	THE ACTION OF GROINS ON BEACH STABILIZATION	4804GR0001
	COAST EROSION AND PROTECTION - STUDIES IN CAUSES AND REMEDIES	5200GR0002
	THE PROBLEM OF COAST EROSION	4700GR0001
	BEACH PROTECTION MEASURES	4210GR0001
	TEST WITH SCALE MODELS TO DETERMINE THE EFFECT OF CURRENTS AND BREAKERS UPON A SANDY BEACH AND THE ADVANTAGEOUS	
	INSTALLATION OF GROINS	2806GR0001
	REPORT TO THE 15TH INTERNATIONAL NAVIGATION CONGRESS	3100GR0001
	CURVED JETTIES SEA WALLS BULKHEADS AND RETAINING WALLS	4001GR0002
	EROSION OF OUR COASTAL FRONTIERS	3804GR0001
	THE PRINCIPLE OF INCREASING PERMEABILITY IN GROIN CONSTRUCTION	0000GR0008
	ONE ASPECT OF THE DYNAMICS OF A COAST PARTLY PROTECTED BY A ROW OF GROYNES	0000GR0001
	THE COASTAL DYNAMICS OF SAND WAVES AND THE INFLUENCE OF BREAKWATERS AND GROYNES	0000GR0002
TIMBER		
	LAND RECLAMATION AND GROIN-BUILDING IN THE TIDAL FLATS	7009GR0004
	CLIFF DRAINAGE AND BEACH DISTRIBUTION	6809GR0006
	VARIATIONS IN GROIN DESIGN	6705GR0001
	CHARACTERISTICS OF SHINGLE BEACHES: THE SOLUTION TO SOME PRACTICAL PROBLEMS	7009GR0006
	COASTAL ENGINEERING STRUCTURES	6307GR0001
	A PICTORIAL HISTORY OF SELECTED STRUCTURES ALONG THE NEW JERSEY COAST	6410GR0001
	COASTAL PROCESSES	6606GR0001
	SHORE PROTECTION PLANNING AND DESIGN	6606GR0002
	PERMEABLE AND SEMIPERMEABLE GROINS FROM OHIO ON LAKE ERIE	6900GR0003
	COASTAL PROTECTION FOR FLORIDA	6310GR0001
	REVIEW OF BEACH EROSION AND STORM TIDE CONDITIONS IN FLORIDA 1961-1962	6211GR0001
	GROINS ON THE SHORE OF THE GREAT LAKES	6105GR0001
	THE SELSEY COAST PROTECTION SCHEME	6112GR0001
	REVIEW OF GERMAN EXPERIENCE ON COASTAL PROTECTION BY GROINS	6307GR0002
	PERMEABLE GROINS FROM ILLINOIS ON LAKE MICHIGAN	6500GR0002
	VARIATIONS IN GROIN DESIGN	6510GR0001

TIMBER

(CONTINUED)

STUDY OF EROSION ALONG HOMER SPIT AND VICINITY KACHEMAK BAY ALASKA

GRINS FROM WISCONSIN ON LAKE MICHIGAN

CURVED GROINS AND FORESHORE DEFENCE

MARYLANDS FAVORITE BEACH AT OCEAN CITY

HOW TO BUILD A BEACH AT ECONOMY PRICES

A CONTRACTOR BATTLES THE TIDES

FUNDAMENTALS OF COAST EROSION AND DEFENCE

COASTAL DEVELOPMENT AND COASTAL PROTECTION

FLORIDA COASTAL PROBLEMS

LES OUVAGES DE DEFENCE CONTRE LA MER SUR LA COTE FRANCAISE DE LOCEAN ENTRE LA LOIRE ET LA GIRONDE

THE FERNANDINA BEACH GROINS

PROTECTING OUR SHORE LINE

DESIGN AND CONSTRUCTION OF THE SEAL BEACH GROIN

LOW COST SHORE PROTECTION USED ON THE GREAT LAKES

COASTAL PROTECTION REVIEW OF METHODS FOR DEFENCE

TIMBER IN THE CONSTRUCTION OF SEA DEFENCE AND RIVER WORKS

DIVISION OF SHORE EROSION - OHIO

BEACH EROSION CONTROL GRAND ISLE LOUISIANA

REPORT TO THE 17TH INTERNATIONAL NAVIGATION CONGRESS

THE PROBLEM OF COAST EROSION

PAPER ON PROTECTIVE WORKS ADAPTED TO LIMIT EROSION ALONG THE OPEN COAST HOW THEY WORK

REPORT TO THE 17TH INTERNATIONAL NAVIGATION CONGRESS

DESIGN AND CONSTRUCTION OF GROINS

EROSION PROBLEMS ON THE OHIO SHORE OF LAKE ERIE

THE DANISH WESTCOAST - LITTORAL DRIFT PROBLEMS AND MEASURES AGAINST COAST EROSION

SHORE PROTECTION METHODS AND MATERIALS

STEEL SHEET PILING FOR SHORE AND BEACH PROTECTION STRUCTURES

REPORT TO THE 17TH INTERNATIONAL NAVIGATION CONGRESS

COAST PROTECTION

ART OF BEACH PROTECTION

COAST EROSION AND PROTECTION - STUDIES IN CAUSES AND REMEDIES

SOME SEA DEFENCE WORKS FOR RECLAIMED LANDS

REPORT TO THE 17TH INTERNATIONAL NAVIGATION CONGRESS

COAST PROTECTION SOME RECENT WORKS ON THE EAST COAST 1942-52

COAST EROSION

INFORMATION ON BEACH PROTECTION IN FLORIDA

DIE SCHUTZBAUEN AUF DER INSEL BORKUM

REPORT ON ST. SIMON ISLAND STUDIES

EFFECTIVENESS OF GROINS AT ROCKAWAY BEACH LONG ISLAND NEW YORK

EROSION OF OUR COASTAL FRONTIERS

EROSION CONTROL AT WRIGHTSVILLE BEACH

PROTECTING GALVESTON BEACH

SHORE EROSION AND CARRAGE PALMETTO GROINS AT NORTH POINT ST. AUGUSTINE FLORIDA

GROYNES

REPORT ON BEACH EROSION AT HOLLYWOOD BEACH FLORIDA

JETTY

JETTY

THE PREVENTION OF COAST EROSION

COAST EROSION IN GREAT BRITAIN

HAWKS NEST BEACH CONNECTICUT

THE PROTECTION AND IMPROVEMENT

SOME DATA ON BEACH PROTECTION WORKS

CONEY ISLAND PUBLIC BEACH AND BOARDWALK IMPROVEMENT

COAST EROSION AND PROTECTION ON LONG ISLAND AND NEW JERSEY

EFFECTIVENESS OF PERMEABLE TYPE GROINS USED FOR BEACH PROTECTION AT SHOREWOOD WISCONSIN AND OTHER CITIES ALONG T

HE WEST SHORE OF LAKE MICHIGAN

6511GR0001
6500GR0001
5607GR0002
5610GR0001
5509GR0001
6004GR0001
5409GR0001
5511GR0001
5712GR0001
5409GR0004
5504GR0002
5812GR0002
6010GR0001
5310GR0001
5311GR0001
5609GR0002
5510GR0002
5604GR0001
4900GR0004
4700GR0001
4806GR0001
4900GR0001
5010GR0001
5204GR0001
5008GR0001
4410GR0002
4410GR0001
4900GR0005
4904GR0001
4510GR0001
5200GR0002
4602GR0001
4900GR0003
5306GR0001
5000GR0003
5210GR0008
3512GR0001
4101GR0001
3812GR0001
3804GR0001
4010GR0001
3807GR0005
3811GR0001
3400GR0001
3801GR0001
3505GR0002
3505GR0001
4204GR0001
4000GR0003
4001GR0003
0306GR0001
3605GR0001
2300GR0001
1508GR0001
3911GF0001

TIMBER	3901GR0001
(CONTINUED)	4104GR0001
BEACH EROSION STUDIES	3806GR0001
THE PREVENTION OF COAST EROSION	3100GR0002
SHORE PROTECTIVE WORK AT WINTHROP MASSACHUSETTS	3100GR0001
REPORT TO THE 15TH INTERNATIONAL NAVIGATION CONGRESS	3807GR0003
REPORT TO THE 15TH INTERNATIONAL NAVIGATION CONGRESS	3807GR0004
SHORE PROTECTIVE WORK AT WINTHROP MASSACHUSETTS	3202GR0001
SHOREWOOD PROTECTS ITS LAKE FRONT	3306GR0001
PROTECTION OF COASTS AGAINST THE SEA WITH OR WITHOUT PREPONDERATING COASTAL DRIFT OF MATERIALS	3612GR0001
DUPLET-TAYLOR ADJUSTABLE SCREW PILE GROYNES	3610GR0001
REPORT OF THE FORESHORE EROSION BOARD	3105GR0001
CALIFORNIA'S BEACH EROSION AND DEVELOPMENT PROBLEMS	4110GR0001
SEA WALLS AND GROINS OF STEEL SHEETING STABILIZE MIAMI BEACH	2712GR0001
CONSTRUCTION AND MAINTENANCE OF THE PUBLIC BEACH AT ROCKAWAY BEACH BOROUGH OF QUEENS	4405GR0001
COAST EROSION	3012GR0001
SEA DEFENCE EROSION AND PROTECTION ON A SANDY COAST	3912GR0001
EROSION OF OUR COASTAL FRONTIERS - PART II	3711GR0001
REPORT OF ADVISORY BOARD ON BEACH PROTECTION LOS ANGELES COUNTY	4000GR0002
EROSION AND PALMETTO GROINS AT NORTH POINT ST.AUGUSTINE FLORIDA	3011GR0001
JETTY	7009GR0003
BEACH EROSION STUDIES	6809GR0001
THE NORTH SHORE VERSUS LAKE MICHIGAN	6206GR0001
TRANSPORT-NORMAL	6112GR0002
EXPERIMENTAL STUDY OF THE HYDRAULIC BEHAVIOR OF INCLINED GROYNES SYSTEMS	6008GR0002
THE DYNAMICS OF A COAST WITH A GROYNES SYSTEM	5800GR0004
A MODEL STUDY OF THE BEHAVIOR OF BEACHES AND GROYNES	0000GR0001
BEACH EROSION AND PROTECTION WORKS IN IMAZU-SAKANO BEACH	5809GR0004
THE DEVELOPMENT OF COAST PROFILES ON A RECEDING COAST PROTECTED BY GROYNES	7009GR0003
BASIC COASTAL MODEL	6510GR0001
ONE ASPECT OF THE DYNAMICS OF A COAST PARTLY PROTECTED BY A ROW OF GROYNES	6406GR0001
T-GROINS	6105GR0001
THE CREATION OF AN ARTIFICIAL BEACH IN LARVOTTO BAY MONTE CARLO PRINCIPALITY OF MONACO	6500GR0004
EXPERIMENTAL STUDY OF THE HYDRAULIC BEHAVIOR OF INCLINED GROYNES SYSTEMS	6310GR0001
VARIATIONS IN GROIN DESIGN	6112GR0002
STABILITY OF BEACHES USING GROINS	6705GR0001
GROINS ON THE SHORE OF THE GREAT LAKES	6400GR0003
REPORT TO THE 21ST INTERNATIONAL NAVIGATION CONGRESS	6107GR0001
NEW COASTAL WORKS AT NAHARIYA (ISRAEL)	5511GR0001
COASTAL PROTECTION FOR FLORIDA	4806GR0001
BEACH EROSION AND PROTECTION WORKS IN IMAZU-SAKANO BEACH	4900GR0001
VARIATIONS IN GROIN DESIGN	5210GR0001
OCEANOGRAPHICAL ENGINEERING	4900GR0003
A STUDY OF GROINS AND THEIR FUNCTION AS HYDRAULIC STRUCTURES	4210GR0001
COASTAL DEVELOPMENT AND COASTAL PROTECTION	3011GR0001
COASTAL PROTECTION REVIEW OF METHODS FOR DEFENCE	4206GR0001
PAPER ON PROTECTIVE WORKS ADAPTED TO LIMIT EROSION ALONG THE OPEN COAST HOW THEY WORK	0000GR0005
REPORT TO THE 17TH INTERNATIONAL NAVIGATION CONGRESS	6705GR0001
MEASURES AGAINST EROSION AT GROINS AND JETTIES	6105GR0001
REPORT TO THE 17TH INTERNATIONAL NAVIGATION CONGRESS	4806GR0001
BEACH PROTECTION MEASURES	5210GR0001
THE NORTH SHORE VERSUS LAKE MICHIGAN	4900GR0003
BEACH PROTECTION MEASURES	4210GR0001
WOSENITZ	3011GR0001
THE WUSENITZ PRECAST PERMEABLE GROIN	4206GR0001
Z-GROINS	
VARIATIONS IN GROIN DESIGN	
VARIATIONS IN GROIN DESIGN	

Z-GROINS	(CONTINUED)		6400GR0003
OCEANOGRAPHICAL ENGINEERING			6310GR0001
COASTAL PROTECTION FOR FLORIDA			5311GR0001
COASTAL DEVELOPMENT AND COASTAL PROTECTION			5210GR0001
COASTAL PROTECTION REVIEW OF METHODS FOR DEFENCE			
MEASURES AGAINST EROSION AT GROINS AND JETTIES			
1800-1900			7009GR0001
THE HISTORY OF THE DUTCH COAST IN THE LAST CENTURY			5409GR0003
PROBLEMS DE DEFENSE DES COTES RESUSITE DE ECHECS DE QUELQUES OUVRAGES			5109GR0001
BEACH PROTECTION ENGINEERS ATTEMPT TO OUTWIT NATURE AT PRESQUE ISLE PENINSULA			5006GR0003
COAST EROSION			
1900-1949			7009GR0001
THE HISTORY OF THE DUTCH COAST IN THE LAST CENTURY			7009GR0003
EXPERIMENTAL STUDY OF THE HYDRAULIC BEHAVIOR OF INCLINED GROUYNE SYSTEMS			6809GR0006
CLIFF DRAINAGE AND BEACH DISTRIBUTION			7009GR0002
SOME SAND TRANSPORT PHENOMENA ON COASTS WITH BARS			6707GR0001
SHORE PROTECTION EXPERIENCE IN THE UNITED STATES			6307GR0002
REVIEW OF GERMAN EXPERIENCE ON COASTAL PROTECTION BY GROINS			6500GR0001
GROINS FROM WISCONSIN ON LAKE MICHIGAN			6500GR0002
PERMEABLE GROINS FROM ILLINOIS ON LAKE MICHIGAN			6510GR0002
USE OF LONG GROINS AS ARTIFICIAL HEADLANDS			6500GR0003
PERMEABLE AND SEMIPERMEABLE GROINS FROM OHIO ON LAKE ERIE			6410GR0001
A PICTORIAL HISTORY OF SELECTED STRUCTURES ALONG THE NEW JERSEY COAST			5409GR0003
PROBLEMS DE DEFENSE DES COTES RESUSITE DE ECHECS DE QUELQUES OUVRAGES			5409GR0001
FUNDAMENTALS OF COAST EROSION AND DEFENCE			5409GR0002
RITUMEN IN COASTAL ENGINEERING			5406GR0001
COAST EROSION AND THE DEVELOPMENT OF BEACH PROFILES			5510GR0001
MARYLANDS FAVORITE BEACH AT OCEAN CITY			5409GR0005
OBSERVATIONS ON THE TRAVEL OF SHORE MATERIAL ALONG A CHALK FORESHORE			5500GR0001
CONCRETE SHORE PROTECTION			6008GR0001
SCALE EFFECTS IN MODELS WITH LITTORAL SAND DRIFT			4806GR0001
PAPER ON PROTECTIVE WORKS ADAPTED TO LIMIT EROSION ALONG THE OPEN COAST HOW THEY WORK			4900GR0003
REPORT TO THE 17TH INTERNATIONAL NAVIGATION CONGRESS			5304GR0001
PRECAST CONCRETE BLOCK GROINS			5000GR0003
COAST EROSION			5109GR0001
BEACH PROTECTION ENGINEERS ATTEMPT TO OUTWIT NATURE AT PRESQUE ISLE PENINSULA			5306GR0001
COAST PROTECTION SOME RECENT WORKS ON THE EAST COAST 1942-52			4800GR0001
EXPERIMENTAL STEEL SHEET PILE GROINS PALM BEACH FLORIDA			4700GR0001
THE PROBLEM OF COAST EROSION			5210GR0003
CASE HISTORY OF SHORE PROTECTION AT PRESQUE ISLE PENINSULA PENNSYLVANIA			5300GR0001
LAKE MICHIGAN EROSION STUDIES			4910GR0002
ALL STEEL GROUYNE - MIAMI BEACH			5006GR0001
THE DANISH WESTCOAST - LITTORAL DRIFT PROBLEMS AND MEASURES AGAINST COAST EROSION			4804GR0001
THE ACTION OF GROINS ON BEACH STABILIZATION			5300GR0003
REPORT TO THE 18TH INTERNATIONAL NAVIGATION CONGRESS			4910GR0001
DETERIORATION OF STEEL SHEET PILE GROINS AT PALM BEACH FLORIDA			5210GR0001
MEASURES AGAINST EROSION AT GROINS AND JETTIES			4101GR0001
REPORT ON ST. SIMON ISLAND STUDIES			0000GR0003
INFLUENCE OF PROTECTIVE WORKS ON THE EROSION OF THE WEST COAST OF SYLT NORTH SEA COAST OF GERMANY			3801GR0001
REPORT ON BEACH EROSION AT HOLLYWOOD BEACH FLORIDA			
EFFECTIVENESS OF PERMEABLE TYPE GROINS USED FOR BEACH PROTECTION AT SHOREWOOD WISCONSIN AND OTHER CITIES ALONG T			
HE WEST SHORE OF LAKE MICHIGAN			3911GR0001
DIE SCHUTZBAUTEN AUF DER INSEL BORKUM			3512GR0001
CONSTRUCTION AND MAINTENANCE OF THE PUBLIC BEACH AT ROCKAWAY BEACH BOROUGH OF QUEENS			3610GR0002
MESH JETTIES			3602GR0001
GROYNES			3400GR0001
EROSION CONTROL AT WRIGHTSVILLE BEACH			4010GR0001

1900-1949

(CONTINUED)

PROTECTING GALVESTON BEACH
EFFECTIVENESS OF GROINS AT ROCKAWAY BEACH LONG ISLAND NEW YORK
BEACH EROSION STUDIES
REPORT ON EROSION AT MANASQUAN INLET NEW JERSEY AND ADJACENT BEACHES
THE PROTECTION AND IMPROVEMENT OF FRESHWATERS BY THE UTILIZATION OF TIDAL AND WAVE ACTION
HAWKS NEST BEACH CONNECTICUT
INVESTIGATIONS OF STEEL SHEET PILING
SHORE EROSION AND CABBAGE PALMETTO GROINS AT NORTH POINT ST. AUGUSTINE FLORIDA
THE NORTH SHORE VERSUS LAKE MICHIGAN
SHORE PROTECTIVE WORK AT WINTHROP MASSACHUSETTS
PERMEABLE GROINS AT KENOSHA WISCONSIN
CONY ISLAND PUBLIC BEACH AND BOARDWALK IMPROVEMENT
EROSION AND PALMETTO GROINS AT NORTH POINT ST. AUGUSTINE FLORIDA
TEST WITH SCALE MODELS TO DETERMINE THE EFFECT OF CURRENTS AND BREAKERS UPON A SANDY BEACH AND THE ADVANTAGEOUS
INSTALLATION OF GROINS

3807GR0005
3812GR0001
3901GR0001
3801GR0002
0306GR0001
4001GR0003
3607GR0002
3811GR0001
3011GR0001
3807GR0003
4001GR0001
2306GR0001
3912GR0001
2806GR0001
4410GR0002
2712GR0001
3612GR0001
4204GR0001
3106GR0001
3806GR0001
3202GR0001
4410GR0003
4110GR0001
3807GR0004
3604GR0002
3012GR0001
3100GR0002
3100GR0001

1950-1954

SOME SAND TRANSPORT PHENOMENA ON COASTS WITH BARS
SHORE PROTECTION EXPERIENCE IN THE UNITED STATES
THE HISTORY OF THE DUTCH COAST IN THE LAST CENTURY
USE OF LONG GROINS AS ARTIFICIAL HEADLANDS
PERMEABLE AND SEMIPERMEABLE GROINS FROM OHIO ON LAKE ERIE
PERMEABLE GROINS FROM ILLINOIS ON LAKE MICHIGAN
GROINS FROM WISCONSIN ON LAKE MICHIGAN
THE NEARSHORE MOVEMENT OF SAND AT DUBUIN
REVIEW OF GERMAN EXPERIENCE ON COASTAL PROTECTION BY GROINS
THE SELSEY COAST PROTECTION SCHEME
THE FERNANJUNA BEACH GROINS
BEACH EROSION CONTROL GRAND ISLE LOUISIANA
MARYLANDS FAVORITE BEACH AT OCEAN CITY
DIVISION OF SHORE EROSION - OHIO
RECEDING OF SHORELINE AT COCHIN BY GROYNES AND A SEAWALL
CONCRETE SHORE PROTECTION
ASPHALT GROINS - TWO YEAR PLAN
THE ASPHALT GROINS AT OCEAN CITY MARYLAND
BEHAVIOR OF SAND ASPHALT GROINS AT OCEAN CITY MARYLAND
BEACH RENOVATION BY USE OF BEACH FILLS AND FURTHER PLANS FOR THE PROTECTION OF THE ISLAND OF NORDENNEY
FUNDAMENTALS OF COAST EROSION AND DEFENCE
PROBLEMS DE DEFENSE DES COTES RESUSCITE DE ECHECS DE OUVRAGES
BITUMEN IN COASTAL ENGINEERING
LAKE MICHIGAN EROSION STUDIES
THE DANISH WESTCOAST - LITTORAL DRIFT PROBLEMS AND MEASURES AGAINST COAST EROSION
CASE HISTORY OF SHORE PROTECTION AT PRESQUE ISLE PENNSYLVANIA

7009GR0002
6707GR0001
7009GR0001
6510GR0002
6500GR0003
6500GR0002
6207GR0001
6307GR0002
6112GR0001
5504GR0002
5604GR0001
5510GR0001
5510GR0002
5900GR0004
5500GR0001
5708GR0001
5504GR0001
5905GR0001
6008GR0005
5409GR0001
5409GR0003
5409GR0002
5300GR0001
5008GR0001
5210GR0003

1950-1954

(CONTINUED)
SUMMARY REPORT ON STUDIES OF SAND TRANSPORTATION BY WAVE ACTION
COAST PROTECTION SOME RECENT WORKS ON THE EAST COAST 1942-52
SOME ASPECTS OF SHORE PROTECTION IN BOSTON HARBOR
EXPERIMENTAL GROINS CAMP PERRY OHIO
LITTORAL PROCESSES ON SANDY COASTS
PRECAST CONCRETE FLOCK GROINS

1955-1959

THE HISTORY OF THE DUTCH COAST IN THE LAST CENTURY
SHORE PROTECTION EXPERIENCE IN THE UNITED STATES
SOME SAND TRANSPORT PHENOMENA ON COASTS WITH BARS
EXPERIMENTAL STUDY OF THE HYDRAULIC BEHAVIOR OF INCLINED GROUYNE SYSTEMS
REVIEW OF GERMAN EXPERIENCE ON COASTAL PROTECTION BY GROINS
THE SELSEY COAST PROTECTION SCHEME
COAST PROTECTION - GROUYNE SYSTEMS
THE NEARSHORE MOVEMENT OF SAND AT DURBIN
BEHAVIOR OF BEACH FILL AND GORROW AREA AT PROSPECT BEACH WEST HAVEN CONNECTICUT
GROINS FROM WISCONSIN ON LAKE MICHIGAN
PERMEABLE GROINS FROM ILLINOIS ON LAKE MICHIGAN
USE OF LONG GROINS AS ARTIFICIAL HEADLANDS
PERMEABLE AND SEMIPERMEABLE GROINS FROM OHIO ON LAKE ERIE
A CONTRACTOR BATTLES THE TIDES
PHOTOGRAPHS OF COMPO BEACH WESTPORT CONNECTICUT AFTER GROIN CONSTRUCTION AND BEFORE FILL PLACEMENT
BEHAVIOR OF SAND AND ASPHALT GROINS AT OCEAN CITY MARYLAND
CURVED GROINS AND FRESHORE DEFENCE
SHORELINE ADVANCEMENT BY SEA WALL AND GROYNES AT COCHIN
RETTET JETTY FOR LESS MONEY

ASPHALT GROINS - TWO YEAR PLAN

PROTECTION WORKS ON THE MEXICAN COAST THE CREATION OF BEACHES AND DUNES
PHOTOGRAPHS OF SASCO HILL BEACH FAIRFIELD CONNECTICUT AFTER GROIN CONSTRUCTION AND BEFORE FILL PLACEMENT
MARYLANDS FAVORITE BEACH AT OCEAN CITY
DESIGN AND CONSTRUCTION OF THE SEAL BEACH GROIN
RECEDING OF SHORELINE AT COCHIN BY GROYNES AND A SEAWALL
FEEDER BEACHES AND GROINS RESTORE PRESQUE ISLE PENINSULA

1960-1964

THE TERMINAL PROBLEM IN COAST PROTECTION
REPORT TO THE 22ND INTERNATIONAL NAVIGATION CONGRESS
EXPERIMENTAL STUDY OF THE HYDRAULIC BEHAVIOR OF INCLINED GROUYNE SYSTEMS
THE HISTORY OF THE DUTCH COAST IN THE LAST CENTURY
COLORED SAND TESTS WITH LUMINESCENT SAND IN GROIN FIELDS
A PICTORIAL HISTORY OF SELECTED STRUCTURES ALONG THE NEW JERSEY COAST
PERMEABLE AND SEMIPERMEABLE GROINS FROM OHIO ON LAKE ERIE
AERIAL PHOTOGRAPHS PLUM ISLAND MASSACHUSETTS
USE OF CONCRETE FOR SHORE PROTECTION
USE OF LONG GROINS AS ARTIFICIAL HEADLANDS
AERIAL PHOTOGRAPHS OF WALLS SAND STATE BEACH NEW HAMPSHIRE
ASPHALT IN BEACH EROSION CONTROL STRUCTURES
SHORE PROTECTION EXPERIENCE IN THE UNITED STATES
GROINS FROM WISCONSIN ON LAKE MICHIGAN
GROINS ON THE SHORES OF THE GREAT LAKES
COAST PROTECTION - GROUYNE SYSTEMS
REVIEW OF GERMAN EXPERIENCE ON COASTAL PROTECTION BY GROINS
THE SELSEY COAST PROTECTION SCHEME
PERMEABLE GROINS FROM ILLINOIS ON LAKE MICHIGAN
SCALE EFFECTS IN MODELS WITH LITTORAL SAND DRIFT
GROINS ON THE SHORE OF THE GREAT LAKES
DESIGN AND CONSTRUCTION OF THE SEAL BEACH GROIN

5201GR0001
5306GR0001
5210GR0004
5309GR0001
5010GR0002
5304GR0001

7009GR0001
6707GR0001
7009GR0002
7009GR0003
6307GR0002
6112GR0001
6204GR0004
6207GR0001

6106GR0001
6500GR0001
6500GR0002
6510GR0002
6500GR0003
6004GR0001
5705GR0001
5905GR0001

5607GR0002
6008GR0003
5903GR0001
5708GR0001
5701GR0001
5705GR0002
5010GR0001
6010GR0001

5900GR0004
5803GR0001
6809GR0005
6900GR0004
7009GR0003
7009GR0001
7000GR0001
6410GR0001

6500GR0003
6208GR0001
6204GR0002
6510GR0002
6306GR0001
6204GR0003
6707GR0001
6500GR0001

6111GR0001
6204GR0004
6307GR0002
6112GR0001
6500GR0002
6008GR0001
6105GR0001
6010GR0001

1960-1964	(CONTINUED)	6000GR0001
	COAST EROSION AND DEFENCE	6010GR0002
	COASTAL PROTECTION IN MASSACHUSETTS	6004GR0001
	A CONTRACTOR BATTLES THE TIDES	0000GR0006
	THE BUDD HORIZONTALLY PERMEABLE GROIN SYSTEM FOR BEACH EROSION CONTROL AND REBUILDING SAND BEACHES	
1965-1969		7009GR0003
	EXPERIMENTAL STUDY OF THE HYDRAULIC BEHAVIOR OF INCLINED GROynes SYSTEMS	6809GR0004
	THE CREATION OF AN ARTIFICIAL BEACH IN LARVOTTO BAY MONTE CARLO PRINCIPALITY OF MONACO	6900GR0004
	REPORT TO THE 22ND INTERNATIONAL NAVIGATION CONGRESS	7009GR0002
	SOME SAND TRANSPORT PHENOMENA ON COASTS WITH BARS	7000GR0001
	COLOR SAND TESTS WITH LUMINESCENT SAND IN GROIN FIELDS	6809GR0007
	THE ATLANTIC COAST OF LONG ISLAND	6810GR0001
	A MATHEMATICAL THEORY ABOUT SAND WAVES AND ITS APPLICATION ON THE DUTCH WADDEN ISLE OF VLIELAND	6500GR0002
	PERMEABLE GROINS FROM ILLINOIS ON LAKE MICHIGAN	6511GR0001
	STUDY OF EROSION ALONG HOMER SPIT AND VICINITY KACHEMAK BAY ALASKA	6512GR0001
	MARITIME AND RIPARIAN USE OF GABIONS	6500GR0001
	GROINS FROM WISCONSIN ON LAKE MICHIGAN	6707GR0001
	SHORE PROTECTION EXPERIENCE IN THE UNITED STATES	6500GR0003
	PERMEABLE AND SEMIPERMEABLE GROINS FROM OHIO ON LAKE ERIE	0000GR0006
	THE BUDD HORIZONTALLY PERMEABLE GROIN SYSTEM FOR BEACH EROSION CONTROL AND REBUILDING SAND BEACHES	0000GR0005
	THE WOSENITZ PRECAST PERMEABLE GROIN	
1970-1974		7105GR0001
	EXPERIMENT IN SHORE PROTECTION	

KEY WORDS AND CATEGORIES

Beach Dynamics under Groin Influence

Accretion	Erosion	Shoaling
Artificial-fill	Scour	Transport-normal

Construction Data

Const-problems	Economics	Structural-design
Const-procedure	Maintenance	

Construction and Survey Dates

1800-1900	1955-1959	1965-1969
1900-1949	1960-1964	1970-1974
1950-1954		

Dimensions

Geometric-shapes	Long	Short
High	Low	

Groin Types and Design

Adjustable	Notched	Terminal
Corner-groins	Single	T-groins
L-groins	Spur	Z-groins
Misc-plan	System	

Location

Africa	Central America	N. Atlantic
Alaska	Europe	N. Pacific
Asia	Great Lakes	S. Atlantic
Australia	Hawaiian Islands	Texas Gulf
California		

Materials

Asphalt	Piling	Steel
Concrete	Rubble-mound	Timber
Misc-materials		

Miscellaneous

House Document
Legal

Not Annotated
Patent

Permeability

Impermeable

Permeable

Trade Names

Budd
Case
Du-Plat-Taylor

Haupt
Milliken
Mobbs

S. M. Wood
Wosenitz

Type of Investigation

Experimental
Field

Model
Photographic

Theory

DEFINITIONS OF KEY WORDS

Accretion: Artificial aggradation where a buildup of the beach occurs by an act of man; in this case by groin construction.

Adjustable: Groins in which height and permeability may be altered.

Africa: Refers to the shoreline of Africa.

Alaska: Refers to the shoreline of Alaska.

Artificial-fill: The process of replenishing a beach by artificial means.

Asia: Refers to any shoreline of the Asian Continent, Japan, Indian Subcontinent, and the eastern shore of the Mediterranean Sea.

Asphalt: Denotes that the groins are built in part or wholly of asphalt.

Australia: Refers to the shoreline of Australia.

Budd: Groin of Budd design.

California: Refers to the shoreline of California.

Case: Groin of Case design.

Central America: Refers to the shores of Central America.

Concrete: Denotes that the groins are built in part or wholly of concrete.

Const-problems: Any problems encountered during groin construction or as a result of faulty construction.

Const-procedure: Construction process and method.

Corner-groins: A type of groin which is built on the line that bisects the angle between the beach and a groin.

Du-Plat-Taylor: Groins of Du-Plat-Taylor design.

Economics: Actual, appropriated, or projected costs of groin construction and maintenance.

Erosion: Refers to shore erosion prior to or as a result of groin construction.

Europe: Refers to the shoreline of all European countries bordering the Atlantic Ocean, North Sea, Baltic Sea, and northern shore of the Mediterranean Sea.

Experimental: Reports which discuss experimental studies on groins either in the field or laboratory.

Field: Actual in-the-field studies as opposed to laboratory studies.

Geometric-shapes: Any material used to construct a groin or a component section of a groin that has geometric regularity, e.g. cellular groin, tetrapods.

Great Lakes: Refers to the shoreline of the Great Lakes.

Haupt: Groin of Haupt design.

Hawaiian Islands: Refers to the shores of the Hawaiian Islands.

High: Groins which are of sufficient height as to impede the passage of littoral drift and overtopping of waves at high tide.

House Document: Refers to U. S. Congress House of Representatives' Reports which contain pertinent data on groins.

Impermeable: Groins which prevent littoral drift from passing through the structure.

Legal: Any legal aspects concerning the construction of groins.

Long: A groin whose length extends beyond the breaker zone.

Low: Groins which do not exceed high tide level, and which allow passage of appreciable quantities of littoral drift by overtopping waves.

L-groins: Groins built in the shape of an "L".

Maintenance: Repair or additional construction of groins.

Milliken: Groin of Milliken design.

Misc-materials: Materials that groins may be constructed of other than the materials listed in the Key Word List.

Misc-plan: A plan view or description of the plan view of the alignment of a single groin or of a groin system with the beach, and the spacing of groins in a system.

Mobbs: Groin of Mobbs design.

Model: Pertains to laboratory investigations of groins by model studies.

Not Annotated: Articles which have not been annotated.

Notched: Groin with the entire length notched at the top providing increased permeability.

N. Atlantic: Refers to the shoreline of the United States from Maine to the Virginia-North Carolina state line.

N. Pacific: The shoreline of northwestern North America from Alaska south to the Oregon-California state line.

Patent: Articles which present groin patents.

Permeable: Groins which (have openings through the structure of sufficient size to) permit passage of appreciable quantities of littoral drift.

Photographic: Articles which present extensive photographic coverage of groins.

Piling: Denotes that the groin is built in part by piles.

Rubble-mound: Groins constructed in part or wholly of stone.

Scour: Removal of underwater material by waves and currents at the base or toe of a groin.

Shoaling: Deposition of underwater material in the vicinity of a groin as a result of decrease in the efficiency of wave and current capacity as caused by groins.

Short: A groin whose length does not extend beyond the breaker zone.

Single: Refers to a single groin.

Spur: A groin-type structure connected to the flank of a groin and normal to it.

Steel: Refers to groins constructed in part or totally of steel.

Structural-design: Design of a groin or system of groins.

System: A series of groins acting together to protect a long section of shoreline.

S. Atlantic: Refers to the shoreline of the United States from the Virginia-North Carolina state line to the tip of the Florida peninsula.

S. M. Wood: Groin of Sydney M. Wood design.

Terminal: The last groin on the updrift end of a groin system.

Texas Gulf: Refers to the shoreline of the Gulf of Mexico from the tip of the Florida peninsula to the Yucatan Peninsula.

Theory: Refers to articles presenting groin designs based upon mathematical formulae, model studies, and personal experience.

Timber: Groins constructed in part or wholly of wood products.

Transport-normal: Movement of beach and near shore material in a vector direction approximately normal to the shoreline.

T-groins: Groins built in the shape of a "T", ie. a groin with a breakwater at its seaward end.

Wosenitz: Groin of Wosenitz design.

Z-groins: A type of groin with one or more marked angular directional changes along its length as seen in plan view.

1800-1900

1900-1949

1950-1954

1955-1959 Inclusive dates denoting construction and survey dates
1960-1964 of groin projects.

1965-1969

1970-1974

K E Y W O R D I N D E X

ABBRUCH	NA - [ABBRUCH] UND SCHUTZ DER STEILFUER AN DER OSTSEEKUSTE	5200GR0003
ABBRUCHSERSCHNITT	NA - GUTACHTLICHE STELLUNGNAHME ZU DEN UNTERSUCHUNGEN UBER DIE URSACHEN DER [ABBRUCHSERSCHNITTUNGEN] AM WEST UND	5200GR0006
	NORD WESTSTRAND DER INSEL NORDERNEY	5200GR0005
ABBRUCHSACHSEN	NA - DIE URSACHEN DER [ABBRUCHSACHSEN] AN DER NORDWESTSTRAND DER INSEL NORDERNEY	5700GR0008
ABRASION	NA - DIE [ABBRUCHSACHSEN] AN DER NORDWESTKUSTE DES ELLENBOGENS AUF SYLT	5500GR0005
ACCRETION	NA - BEACH [ABRASION] BY WAVES - REFLECTION ON STEEP WALL TYPE OF COASTAL PROTECTIVE STRUCTURES	2600GR0001
ADJUSTABLE	NA - CAUSES OF COAST EROSION AND [ACCRETION]	3306GR0001
ADVANTAGEOUS	DU-PLAT-TAYLOR [ADJUSTABLE] SCREW PILE GROYNES	2806GR0001
	TEST WITH SCALE MODELS TO DETERMINE THE EFFECT OF CURRENTS AND BREAKERS UPON A SANDY BEACH AND THE	3012GR0001
	[ADVANTAGEOUS] INSTALLATION OF GROINS	6306GR0001
ADVISORY-BOARD	REPORT OF [ADVISORY-BOARD] ON BEACH PROTECTION LOS-ANGELES COUNTY	6206GR0001
AERIAL	[AERIAL] PHOTOGRAPHS OF WALLIS-SAND STATE-BEACH RYE NEW-HAMPSHIRE	3607GR0001
AGENCIES	[AERIAL] PHOTOGRAPHS PLUM ISLAND MASSACHUSETTS	6511GR0001
	PARTICIPATION OF FEDERAL RELIEF [AGENCIES] IN BEACH PROTECTION PROJECTS	5511GR0005
ALASKA		5500GR0002
	STUDY OF EROSION ALONG HOMER SPIT AND VICINITY KACHEMAK-BAY [ALASKA]	6400GR0001
ALIGNMENT	NA - ON THE [ALIGNMENT] OF COASTAL GROINS	6106GR0002
ALLGEMEINE	NA - [ALLGEMEINE] EMPFEHLUNGEN FUR DEN DEUTSCHEN KUSTENSCHUTZ	5403GR0001
ALLUVIAL	STABILIZATION OF SHINGLE [ALLUVIAL] SHORES BY GROINS OF FULL PROFILE	4812GR0004
AMELIA	NA - [AMELIA] ISLAND FLORIDA BEACH EROSION CONTROL STUDY	6400GR0004
ANAHAIM-BAY	NA - [ANAHAIM-BAY] HARBOR CALIFORNIA	5609GR0001
ANNA-MARIA	NA - [ANNA-MARIA] AND LONGBOAT KEYS FLORIDA BEACH EROSION STUDY	6505GR0001
ARCIA	NA - PROTECCAO DA COSTA CONTRA A ERUSAO MARITIMA E FORMACAO DE PRAIAS DE [ARCIA] - DOIS PROBLEMAS NA COSTA DE MOCAMBIQUE	3711GR0002
ARRANGEMENT	[ARRANGEMENT] OF GROINS ON A SANDY BEACH	6809GR0004
ARTHUR-KILL	NA - STATEN ISLAND FORT-WADSWORTH TO [ARTHUR-KILL] NEW-YORK BEACH EROSION CONTROL STUDY	6510GR0002
ARTIFICIAL	NA - STUDY OF AN [ARTIFICIAL] BATHING BEACH AT-ORCHARD-BEACH PELHAM-BAY NEW-YORK	5700GR0014
	THE CREATION OF AN [ARTIFICIAL] BEACH IN LARVOTTO-BAY MONTE-CARLO PRINCIPALITY OF MONACO	
	USE OF LONG GROINS AS [ARTIFICIAL] HEADLANDS	
	NA - [ARTIFICIAL] RESTORATION OF BEACHES WITH SPECIAL REGARD FOR BEACH FLUSHING NORDERNEY 1951-52	
ARTIFICIALLY	EFFECT OF PARTICLE SIZE AND DISTRIBUTION ON STABILITY OF [ARTIFICIALLY] FILLED BEACH PRESQUE-ISLE PENINSULA	
ASHTABULA	PENNSYLVANIA	6805GR0001
	NA - APPENDICES V AND X OHIO SHORE LINE OF LAKE-ERIE BETWEEN [ASHTABULA] AND THE PENNSYLVANIA STATE LINE BEACH	5201GR0003
	EROSION CONTROL STUDY	

ASHTABULA (CONTINUED)
 NA - APPENDICES III VII AND XII OHIO SHORE LINE OF LAKE-ERIE BETWEEN FAIRPORT AND [ASHTABULA] BEACH EROSION CONTROL STUDY 5201GR0002

ASPHALT
 NA - REPORT ON THE USE OF [ASPHALT] AT GROIN CONSTRUCTION IN DELFTLAND (HOLLAND) 4600GR0001
 NA - CONSTRUCTION OF A HEAVY DUNE COVER BY [ASPHALT] BASALT METHOD ON THE ISLAND OF BORKUM 5700GR0005
 NA - [ASPHALT] CONSTRUCTION IN GROIN BUILDING 5200GR0007
 [ASPHALT] GROINS 6204GR0001
 [ASPHALT] GROINS AND JETTIES 5511GR0002
 INTERIM REPORT ON [ASPHALT] GROINS AT OCEAN-CITY MARYLAND 5607GR0001
 BEHAVIOR OF SAND [ASPHALT] GROINS AT OCEAN-CITY MARYLAND 5905GR0001
 THE [ASPHALT] GROINS AT OCEAN-CITY MARYLAND 5504GR0001
 NA - [ASPHALT] GROINS IN USA 5600GR0008
 [ASPHALT] GROINS - TWO YEAR PLAN 5708GR0001
 NA GROINS WITH [ASPHALT] GROUT IN EAST FRIESIAN COAST REGION 5900GR0002
 [ASPHALT] IN BEACH EROSION CONTROL STRUCTURES 6204GR0003
 APPLICATION OF [ASPHALT] IN HYDRAULIC ENGINEERING WORKS 5101GR0001
 NA - POSSIBILITIES AND LIMITS FOR APPLICATION OF [ASPHALT] TYPES OF CONSTRUCTIONS FOR COASTAL PROTECTION 5700GR00013

ATLANTIC
 THE [ATLANTIC] COAST OF LONG-ISLAND 6809GR0007
 NA - [ATLANTIC] COAST OF LONG-ISLAND FIRE-ISLAND INLET AND SHORE WESTERLY TO JONES INLET NEW-YORK 6503GR0002
 NA - [ATLANTIC] COAST OF NEW-YORK-CITY FROM EAST ROCKAWAY INLET TO ROCKAWAY INLET AND JAMAICA-BAY NEW-YORK 6506GR0001
 LIFE OF STEEL SHEET PILE STRUCTURES IN [ATLANTIC] COASTAL STATES 5210GR0002
 THE PROTECTION AND PRESERVATION OF THE [ATLANTIC] SHORE FRONT OF THE STATE OF NEW-YORK 6207GR0002

ATLANTIC-BEACH
 NA - FORT-WACON - [ATLANTIC-BEACH] AND VICINITY NORTH-CAROLINA 6209GR0002

ATLANTIC-CITY
 NA - [ATLANTIC-CITY] NEW-JERSEY BEACH EROSION CONTROL STUDY 6407GR0002
 NA - [ATLANTIC-CITY] NEW-JERSEY BEACH EROSION CONTROL STUDY 5003GR0001

BAKERS-HAULOVER
 NA - BEACH EROSION STUDY OF [BAKERS-HAULOVER] INLET FLORIDA 4604GR0002

BALTIC-SEA
 NA - GENERAL COASTAL DYNAMICS AND COASTAL PROTECTION OF THE SOUTH [BALTIC-SEA] BETWEEN TRAVE AND SWINE 5400GR0005
 NA - WHAT HAPPENED TO PROTECTION OF OUR [BALTIC-SEA] COAST 5600GR0002
 NA - WATER ECONOMY BETWEEN NORTH AND [BALTIC-SEA] KIEL 5100GR0001
 NA - WATER ECONOMY BETWEEN NORTH-SEA AND [BALTIC-SEA] 1948-58 5800GR0005

BARNEGAT
 NA - SHORE OF NEW-JERSEY FROM SANDY-HOOK TO [BARNEGAT] INLET BEACH EROSION CONTROL STUDY 5603GR0001
 NA - SHORE OF NEW-JERSEY FROM SANDY-HOOK TO [BARNEGAT] INLET BEACH EROSION CONTROL STUDY 5802GR0002
 NA - SHORE OF NEW-JERSEY - [BARNEGAT] INLET TO CAPE-MAY-CANAL BEACH EROSION CONTROL STUDY 5908GR0001

BARRIERS
 NA - GROYNES AS [BARRIERS] TO MOVEMENT OF BEACH MATERIAL 6200GR0003

BASALT
 NA - CONSTRUCTION OF A HEAVY DUNE COVER BY ASPHALT [BASALT] METHOD ON THE ISLAND OF BORKUM 5700GR0005

BATHING
 NA - STUDY OF AN ARTIFICIAL [BATHING] BEACH AT ORCHARO-BEACH PELHAM-BAY NEW-YORK 3711GR0002

BEHAVIOR
 BEACH [BEHAVIOR] NORTH SHORE LONG-ISLAND SOUND 7011GR0001
 [BEHAVIOR] OF BEACH FILL AND BORROW AREA AT PROSPECT-BEACH WEST-HAVEN CONNECTICUT 6108GR0001
 [BEHAVIOR] OF BEACH FILL AT OCEAN-CITY NEW-JERSEY 5602GR0001
 [BEHAVIOR] OF BEACH FILLS IN NEW-ENGLAND 6102GR0001
 [BEHAVIOR] OF BEACH FILLS IN NEW-ENGLAND 6206GR0002
 A MODEL STUDY OF THE [BEHAVIOR] OF BEACHES AND GROYNES 6206GR0001
 EXPERIMENTAL STUDY OF THE HYDRAULIC [BEHAVIOR] OF GROYNES SYSTEMS 6809GR0003
 EXPERIMENTAL STUDY OF THE HYDRAULIC [BEHAVIOR] OF INCLINED GROYNES SYSTEMS 7009GR0003
 [BEHAVIOR] OF SAND ASPHALT GROINS AT OCEAN-CITY MARYLAND 5905GR0001

37036R0001	BELGIUM	COAST PROTECTION ON THE NORTH-SEA COASTS OF HOLLAND, FRANCE [BELGIUM] AND GERMANY
62026R0001	BELLE-PASS	NA - [BELLE-PASS] TO RACCOON POINT LOUISIANA BEACH EROSION CONTROL STUDY
58026R0001	BERRIEN	NA - [BERRIEN] COUNTY MICHIGAN BEACH EROSION CONTROL STUDY
59036R0001	BETTER	[BETTER] JETTY FOR LESS MONEY
52016R0003	BETWEEN	NA - APPENDIXES V AND X OHIO SHORE LINE OF LAKE-ERIE [BETWEEN] ASHTABULA AND THE PENNSYLVANIA STATE LINE BEACH EROSION CONTROL STUDY
52016R0002		NA - APPENDICES III VII AND XII OHIO SHORE LINE OF LAKE-ERIE [BETWEEN] FAIRPORT AND ASHTABULA BEACH EROSION CONTROL STUDY
51006R0001		MOTION OF SAND PARTICLES [BETWEEN] GROINS
58006R0005	NA	NA - WATER ECONOMY [BETWEEN] NORTH AND BALTIC-SEA KIEL
59106R0001	NA	NA - WATER ECONOMY [BETWEEN] NORTH-SEA AND BALTIC-SEA 1948-58
54006R0005	NA	NA - SHORE [BETWEEN] PEABERTON POINT AND CAPE-COD MASSACHUSETTS BEACH EROSION CONTROL STUDY
53086R0003	NA	NA - GENERAL COASTAL DYNAMICS AND COASTAL PROTECTION OF THE SOUTH BALTIC-SEA [BETWEEN] TRAVE AND SWINE CONTROL STUDY
58006R0001	BIOLOGICAL	NA - [BIOLOGICAL] HELP IN COASTAL PROTECTION
62096R0004	BISCAYNE	NA - BEACH EROSION CONTROL REPORT ON COUPEENATIVE STUDY OF VIRGINIA AND [BISCAYNE] KEYS FLORIDA
54096R0002	BITUMEN	[BITUMEN] IN COASTAL ENGINEERING
53006R0004	NA	NA - HYDRAULIC STRUCTURES I GROINS DAMS DYKES AND CANAL EMBANKMENTS I OF [BITUMEN] TYPE
52056R0001	BLOCK	NA - REPORT ON CONCRETE [BLOCK] GROINS
53046R0001		PRECAST CONCRETE [BLOCK] GROINS
29026R0001	BLOCKS	DETAIL OF CONCRETE [BLOCK] USED IN GROINS CONSTRUCTED AT MONTECITO CALIFORNIA
52046R0002		CONCRETE [BLOCKS] FORM LOW-COST GROINS
23006R0001	BOARDWALK	CONEY ISLAND PUBLIC BEACH AND [BOARDWALK] IMPROVEMENT
57006R0005	BORKUM	NA - CONSTRUCTION OF A HEAVY DUNE COVER BY ASPHALT BASALT METHOD ON THE ISLAND OF [BORKUM]
35126R0001		DIE SCHUTZBAUTEN AUF DER INSEL [BORKUM]
36106R0002	BOROUGH	CONSTRUCTION AND MAINTENANCE OF THE PUBLIC BEACH AT ROCKAWAY-BEACH [BOROUGH] OF QUEENS
61086R0001	BORROW	BEHAVIOR OF BEACH FILL AND [BORROW] AREA AT PROSPECT-BEACH WEST-HAVEN CONNECTICUT
52106R0004	BOSTON	SOME ASPECTS OF SHORE PROTECTION IN [BOSTON] HARBOR
57006R0010	BRANDUNGSUNTERSUCH	BRANDUNGSUNTERSUCH
28066R0001	BREAKERS	NA - [BRANDUNGSUNTERSUCHUNGEN] AN DEN KUSTEN VON FEHMARN UND NORDWAGRIEN
53006R0005		TEST WITH SCALE MODELS TO DETERMINE THE EFFECT OF CURRENTS AND [BREAKERS] UPON A SANDY BEACH AND THE ADVANTAGEOUS INSTALLATION OF GROINS
53116R0002	BREAKING	NA - STEEP SHORE OF BROOKTON - CAUSE OF [BREAKING] ...
70096R0007	BREAKWATER	NA - APPENDIX II COAST OF CALIFORNIA POINT MUGU TO SAN-PEDRO [BREAKWATER] BEACH EROSION CONTROL STUDY
00006R0002	BREAKWATERS	VARIATION OF TOPOGRAPHY OF SEA-BED CAUSED BY THE CONSTRUCTION OF [BREAKWATERS] THE COASTAL DYNAMICS OF SAND WAVES AND THE INFLUENCE OF [BREAKWATERS] AND GROYNES

BREVARD NA - [BREVARD] COUNTY FLORIDA 6807GR0001
 BRODTEN NA - STEEP SHORE OF [BRODTEN] - CAUSE OF BREAKING ... 5300GR0005
 BROWARD NA - PALM-BEACH COUNTY FLORIDA FROM MARTIN COUNTY LINE TO LAKE-WORTH INLET AND FROM SOUTH-LAKE-WORTH INLET TO [BROWARD] COUNTY LINE BEACH EROSION CONTROL STUDY 6105GR0002
 BUDD THE [BUDD] HORIZONTALLY PERMEABLE GROIN SYSTEM FOR BEACH EROSION CONTROL AND REBUILDING SAND BEACHES 0000GR0006
 BUHNE NA - DIE WIRKUNG DER [BUHNE] H IN WANGERROOGE WEST AUF DIE SEEGAT 5200GR0004
 NA - APPENDIX VI HUMBOLDT-BAY ([BUHNE] POINT) CALIFORNIA BEACH EROSION CONTROL STUDY 5709GR0001
 BUHNENWIRKUNG NA - DIE [BUHNENWIRKUNG] 2806GR0002
 BUILD HOW TO [BUILD] A BEACH AT ECONOMY PRICES 5509GR0001
 BUILDING NA - ASPHALT CONSTRUCTION IN GROIN [BUILDING] 5200GR0007
 BUILT PERMEABLE JETTIES [BUILT] TO PROTECT CLEVELANDS SHORE 4507GR0001
 BULKHEADS CURVED JETTIES SEA-WALLS [BULKHEADS] AND RETAINING WALLS 4001GR0002
 BYRAM NA - AREAS 8 AND 11 SAUGATUCK RIVER TO [BYHAM] RIVER CONNECTICUT BEACH EROSION CONTROL STUDY 5705GR0003
 CABBAGE SHORE EROSION AND [CABBAGE] PALMETTO GROINS AT NORTH POINT ST.AUGUSTINE FLORIDA 3811GR0001
 CALIFORNIA NA - SPECIAL STUDY OF CITY OF SAN-DIEGO (SUNSET-CLIFFS) [CALIFORNIA] 6608GR0001
 NA - ANAHEIM-BAY HARBOR [CALIFORNIA] 5403GR0001
 NA - BEACH EROSION AT SANTA-BARBARA [CALIFORNIA] 3803GR0001
 NA - BEACH EROSION STUDY ORANGE COUNTY [CALIFORNIA] 4002GR0001
 NA - BEACH EROSION STUDY CORONADO [CALIFORNIA] 4202GR0001
 DETAIL OF CONCRETE BLOCK USED IN GROINS CONSTRUCTED AT MONTECITO [CALIFORNIA] 2802GR0001
 NA - SAN-DIEGO COUNTY [CALIFORNIA] APPENDIX IV PHASE 2 BEACH EROSION CONTROL STUDY 6009GR0001
 NA - SAN-GABRIEL RIVER TO NEWPORT-BAY ORANGE COUNTY [CALIFORNIA] APPENDIX V PHASE II BEACH EROSION CONTROL STUDY 6210GR0002
 NA - APPENDIX VI HUMBOLDT-BAY (BUHNE POINT) [CALIFORNIA] BEACH EROSION CONTROL STUDY 5709GR0001
 NA - OCEANSIDE OCEAN-BEACH IMPERIAL-BEACH AND CORONADO SAN-DIEGO COUNTY [CALIFORNIA] BEACH EROSION CONTROL STUDY 5605GR0001
 NA - SANTA-CRUZ COUNTY [CALIFORNIA] BEACH EROSION CONTROL STUDY 5705GR0004
 NA - APPENDIX I COAST OF [CALIFORNIA] CARPENTERIA TO POINT MUGU BEACH EROSION CONTROL STUDY 4812GR0006
 NA - APPENDIX II COAST OF [CALIFORNIA] POINT MUGU TO SAN-PEDRO BREAKWATER BEACH EROSION CONTROL STUDY 5210GR0007
 NA - COAST OF SOUTHERN [CALIFORNIA] - SPECIAL INTERIM REPORT ON THE VENTURA AREA COOPERATIVE BEACH EROSION CONTROL STUDY 5311GR0002
 CALIFORNIA'S 6206GR0002
 [CALIFORNIA]S BEACH EROSION AND DEVELOPMENT PROBLEMS
 CAMP-PERRY CAMP-PERRY EXPERIMENTAL GROINS [CAMP-PERRY] OHIO 3610GR0001
 CANAL NA - HYDRAULIC STRUCTURES (GROINS DAMS DYKES AND [CANAL] EMBANKMENTS) OF BITUMEN TYPE 5309GR0001
 CANTERBURY-BIGHT NA - BEACH EROSION AND COASTAL DEVELOPMENT IN THE [CANTERBURY-BIGHT] 5300GR0004
 CAPE-COD NA - SHORE BETWEEN PEMBERTON POINT AND [CAPE-COD] MASSACHUSETTS BEACH EROSION CONTROL STUDY 6900GR0002
 CAPE-MAY NA - COLD-SPRING INLET ([CAPE-MAY] HARBOR) NEW-JERSEY 5910GR0001
 NA - 5307GR0001

CAPE-MAY-CANAL
 NA - SHORE OF NEW-JERSEY - BARNEGAT INLET TO [CAPE-MAY-CANAL] BEACH EROSION CONTROL STUDY
 NA - NEW-JERSEY COAST OF DELAWARE-BAY FROM [CAPE-MAY-CANAL] TO MAURICE RIVER BEACH EROSION CONTROL STUDY
 CAROLINA-BEACH
 NA - [CAROLINA-BEACH] AND VICINITY NORTH-CAROLINA
 CARPENTERIA
 NA - APPENDIX I COAST OF CALIFORNIA [CARPENTERIA] TO POINT MUGU BEACH EROSION CONTROL STUDY
 CAUSE
 NA - STEEP SHORE OF BRUDTEN - [CAUSE] OF BREAKING ***
 CAUSED
 VARIATION OF TOPOGRAPHY OF SEA-BED [CAUSED] BY THE CONSTRUCTION OF BREAKWATERS
 CAUSES
 COAST EROSION AND PROTECTION - STUDIES IN [CAUSES] AND REMEDIES
 COAST [CAUSES] OF COAST EROSION AND ACCRETION
 CHAGRIN
 NA - APPENDIX XI OHIO SHORE LINE OF LAKE-ERIE EUCLID TO [CHAGRIN] RIVER BEACH EROSION CONTROL STUDY
 CHALK
 OBSERVATIONS ON THE TRAVEL OF SHORE MATERIAL ALONG A [CHALK] FORESHORE
 CHANGES
 NA - COASTAL [CHANGES] AND COASTAL PROTECTION OF THE ISLAND HIDDENSEE
 NA - SURGE AND SHORE [CHANGES] ON THE WEST COAST OF SYLT
 CHARACTERISTICS
 NA - ON THE FLOW [CHARACTERISTICS] IN THE VICINITY OF GROINS
 [CHARACTERISTICS] OF SHINGLE BEACHES: THE SOLUTION TO SOME PRACTICAL PROBLEMS
 CHATHAM
 NA - [CHATHAM] MASSACHUSETTS BEACH EROSION CONTROL STUDY
 CHECK
 NA - PERMEABLE GROINS OF CONCRETE [CHECK] BEACH EROSION
 CLARK
 NA - [CLARK] POINT NEW-BEDFORD MASSACHUSETTS BEACH EROSION CONTROL STUDY
 CLEVELAND
 NA - [CLEVELAND] AND LAKEWOOD OHIO BEACH EROSION CONTROL STUDY
 CLEVELANDS
 PERMEABLE JETTIES BUILT TO PROTECT [CLEVELANDS] SHORE
 CLIFF [CLIFF] DRAINAGE AND BEACH DISTRIBUTION
 COCHIN
 SHORELINE ADVANCEMENT BY SEA-WALL AND GROYNES AT [COCHIN]
 RECEDING OF SHORELINE AT [COCHIN] BY GROYNES AND A SEAWALL
 COLD-SPRING
 NA - [COLD-SPRING] INLET (CAPE-MAY HARBOR) NEW-JERSEY
 COLONIAL-BEACH
 NA - [COLONIAL-BEACH] VIRGINIA BEACH EROSION CONTROL STUDY
 COLORED
 [COLORED] SAND TESTS WITH LUMINESCENT SAND IN GROIN FIELDS
 COMMUNITY
 NA - SHORE OF SHEFFIELD-LAKE [COMMUNITY] PARK OHIO BEACH EROSION CONTROL STUDY
 COMPO-BEACH
 NA - BEACH EROSION AT [COMPO-BEACH] WESTPORT CONNECTICUT
 PHOTOGRAPHS OF [COMPO-BEACH] WESTPORT CONNECTICUT AFTER GROIN CONSTRUCTION AND BEFORE FILL PLACEMENT
 CONCRETE
 PIERS AND JETTIES OF PRECAST [CONCRETE]
 NA - REPORT ON [CONCRETE] BLOCK GROINS
 PRECAST [CONCRETE] BLOCK GROINS
 DETAIL OF [CONCRETE] BLOCK USED IN GROINS CONSTRUCTED AT MONTECITO CALIFORNIA
 [CONCRETE] BLOCKS FORM LOW-COST GROINS
 NA - PERMEABLE GROINS OF [CONCRETE] CHECK BEACH EROSION

5908GR0001
 6106GR0001
 6205GR0002
 5210GR0007
 5300GR0005
 7009GR0007
 5200GR0002
 2600GR0001
 5402GR0001
 5409GR0005
 5600GR0007
 5500GR0007
 5511GR0004
 7009GR0006
 5704GR0001
 3500GR0001
 6209GR0003
 5003GR0002
 4507GR0001
 6809GR0006
 6008GR0003
 5900GR0004
 5307GR0001
 4909GR0001
 7000GR0001
 6205GR0001
 3506GR0001
 5705GR0001
 4602GR0002
 5205GR0001
 5304GR0001
 2902GR0001
 5204GR0002
 3500GR0001

CONCRETE (CONTINUED)
USE OF [CONCRETE] FOR SHORE PROTECTION
[CONCRETE] SHORE PROTECTION
[CONCRETE] SHORE PROTECTION STRUCTURES

CONDITIONS
COASTAL PROTECTION PROCEDURES WITH SPECIAL REFERENCE TO [CONDITIONS] IN FLORIDA
REVIEW OF BEACH EROSION AND STORM TIDE [CONDITIONS] IN FLORIDA 1961-1962

CONEY
[CONEY] ISLAND PUBLIC BEACH AND BOARDWALK IMPROVEMENT

CONGRESS
REPORT TO THE 21ST INTERNATIONAL NAVIGATION [CONGRESS]
REPORT TO THE 22ND INTERNATIONAL NAVIGATION [CONGRESS]
REPORT TO THE 22ND INTERNATIONAL NAVIGATION [CONGRESS]
NA - REPORT TO THE 22ND INTERNATIONAL NAVIGATION [CONGRESS]
REPORT TO THE 17TH INTERNATIONAL NAVIGATION [CONGRESS]
NA - REPORT TO THE 17TH INTERNATIONAL NAVIGATION [CONGRESS]
REPORT TO THE 17TH INTERNATIONAL NAVIGATION [CONGRESS]
REPORT TO THE 17TH INTERNATIONAL NAVIGATION [CONGRESS]
NA - REPORT TO THE 17TH INTERNATIONAL NAVIGATION [CONGRESS]
NA - REPORT TO THE 17TH INTERNATIONAL NAVIGATION [CONGRESS]
REPORT TO THE 18TH INTERNATIONAL NAVIGATION [CONGRESS]
REPORT TO THE 17TH INTERNATIONAL NAVIGATION [CONGRESS]
REPORT TO THE 15TH INTERNATIONAL NAVIGATION [CONGRESS]
REPORT TO THE 15TH INTERNATIONAL NAVIGATION [CONGRESS]

CONNECTICUT
BEHAVIOR OF BEACH FILL AND BORROW AREA AT PROSPECT-BEACH WEST-HAVEN [CONNECTICUT]
NA - BEACH EROSION AT COMPO-BEACH WESTPORT [CONNECTICUT]
HAWKS-NEST-BEACH [CONNECTICUT]
PHOTOGRAPHS OF SASCO-HILL-BEACH FAIRFIELD [CONNECTICUT] AFTER GROIN CONSTRUCTION AND BEFORE FILL PLACEMENT
PHOTOGRAPHS OF COMPO-BEACH WESTPORT [CONNECTICUT] AFTER GROIN CONSTRUCTION AND BEFORE FILL PLACEMENT
NA - THAMES RIVER TO NANTIC-BAY [CONNECTICUT] BEACH EROSION CONTROL STUDY
NA - AREA 9 EAST RIVER TO NEW-HAVEN HARBOR [CONNECTICUT] BEACH EROSION CONTROL STUDY
NA - AREA 8 AND 11 SAUGATUCK RIVER TO BYRAM RIVER [CONNECTICUT] BEACH EROSION CONTROL STUDY
NA - AREA 2 - HAMMONASSET RIVER TO EAST RIVER [CONNECTICUT] BEACH EROSION CONTROL STUDY
NA - AREA 6 - NANTIC-BAY TO CONNECTICUT RIVER [CONNECTICUT] BEACH EROSION CONTROL STUDY
NA - AREA 1 - ASH CREEK TO SAUGATUCK RIVER [CONNECTICUT] BEACH EROSION CONTROL STUDY
NA - AREA 3 - HOUSATONIC RIVER TO ASH CREEK [CONNECTICUT] BEACH EROSION CONTROL STUDY
NA - AREA 3 - NEW-HAVEN HARBOR TO HOUSATONIC RIVER [CONNECTICUT] BEACH EROSION CONTROL STUDY
NA - AREA 5 - PAMCATUCK RIVER TO THAMES RIVER [CONNECTICUT] BEACH EROSION CONTROL STUDY
NA - AREA 4 - CONNECTICUT RIVER TO HAMMONASSET RIVER [CONNECTICUT] BEACH EROSION CONTROL STUDY
NA - AREA 6 - NANTIC-BAY TO [CONNECTICUT] RIVER CONNECTICUT BEACH EROSION CONTROL STUDY
NA - AREA 4 - [CONNECTICUT] RIVER TO HAMMONASSET RIVER CONNECTICUT BEACH EROSION CONTROL STUDY

CONSERVATION
NA - CULTIVATED LAND [CONSERVATION] AND RECLAMATION

CONSTRUCTED
DETAIL OF CONCRETE BLOCK USED IN GROINS [CONSTRUCTED] AT MONTECITO CALIFORNIA

CONSTRUCTION
NA - MODEL TESTS WITH MOVEABLE FLOOR IN SEA AND SEA HARBOR [CONSTRUCTION]
THE PRINCIPLE OF INCREASING PERMEABILITY IN GROIN [CONSTRUCTION]
GALVESTON-BEACH [CONSTRUCTION]
PHOTOGRAPHS OF COMPO-BEACH WESTPORT CONNECTICUT AFTER GROIN [CONSTRUCTION] AND BEFORE FILL PLACEMENT
PHOTOGRAPHS OF SASCO-HILL-BEACH FAIRFIELD CONNECTICUT AFTER GROIN [CONSTRUCTION] AND BEFORE FILL PLACEMENT
[CONSTRUCTION] AND MAINTENANCE OF THE PUBLIC BEACH AT ROCKAWAY-BEACH BOROUGH OF QUEENS
A NEW METHOD OF [CONSTRUCTION] IN COAST EROSION CONTROL
NA - REPORT ON THE USE OF ASPHALT AT GROIN [CONSTRUCTION] IN DELFTLAND (HOLLAND)
NA - ASPHALT [CONSTRUCTION] IN GROIN BUILDING
NA - [CONSTRUCTION] OF A HEAVY DUNE COVER BY ASPHALT BASALT METHOD ON THE ISLAND OF BORKUM

CONSTRUCTION (CONTINUED)
 VARIATION OF TOPOGRAPHY OF SEA-BED CAUSED BY THE [CONSTRUCTION] OF BREAKWATERS
 DESIGN AND [CONSTRUCTION] OF GROINS
 TIMBER IN THE [CONSTRUCTION] OF SEA DEFENCE AND RIVER WORKS
 DESIGN AND [CONSTRUCTION] OF THE SEAL-BEACH GROIN
 EARLY ATTEMPTS AT INLET [CONSTRUCTION] ON THE FLORIDA EAST COAST
 [CONSTRUCTION] WORKS FOR THE PROTECTION OF THE COASTS

CONSTRUCTIONS
 NA - POSSIBILITIES AND LIMITS FOR APPLICATION OF ASPHALT TYPES OF [CONSTRUCTIONS] FOR COASTAL PROTECTION

CONTRACTOR
 COOPERATIVE
 A [CONTRACTOR] BATTLES THE TIDES

NA - COAST OF SOUTHERN CALIFORNIA - SPECIAL INTERIM REPORT ON THE VENTURA AREA [COOPERATIVE] BEACH EROSION CONTROL STUDY

NA - VIRGINIA-BEACH VIRGINIA [COOPERATIVE] BEACH EROSION CONTROL STUDY

NA - FIRE-ISLAND INLET TO JONES INLET LONG-ISLAND NEW-YORK [COOPERATIVE] BEACH EROSION CONTROL STUDY

NA - BEACH EROSION CONTROL REPORT ON [COOPERATIVE] STUDY OF VIRGINIA AND BISCAYNE KEYS FLORIDA

CORONADO
 NA - BEACH EROSION STUDY [CORONADO] CALIFORNIA

NA - OCEANSIDE OCEAN-BEACH IMPERIAL-BEACH AND [CORONADO] SAN-DIEGO COUNTY CALIFORNIA BEACH EROSION CONTROL STUDY

COST
 LOW [COST] SHORE PROTECTION USED ON THE GREAT-LAKES

COSTA
 NA - PROTECCAO DA [COSTA] CONTRA A EROSAO MARITIMA E FORMACAO DE PRAIAS DE ARCIA - DOIS PROBLEMAS NA COSTA DE MOCAMBIQUE

NA - PROTECCAO DA COSTA CONTRA A EROSAO MARITIMA E FORMACAO DE PRAIAS DE ARCIA - DOIS PROBLEMAS NA [COSTA] DE MOCAMBIQUE

COSTS
 CERTAIN POINTS ABOUT EROSION [COSTS] AND MEASURES OF PROTECTION

COUNTY
 REPORT OF ADVISORY-BOARD ON BEACH PROTECTION LOS-ANGELES [COUNTY]

NA - BEACH EROSION STUDY ORANGE [COUNTY] CALIFORNIA

NA - SAN-DIEGO [COUNTY] CALIFORNIA APPENDIX IV PHASE 2 BEACH EROSION CONTROL STUDY

NA - SAN-GABRIEL RIVER TO NEWPORT-BAY ORANGE [COUNTY] CALIFORNIA APPENDIX V PHASE II BEACH EROSION CONTROL STUDY

NA - OCEANSIDE OCEAN-BEACH IMPERIAL-BEACH AND CORONADO SAN-DIEGO [COUNTY] CALIFORNIA BEACH EROSION CONTROL STUDY

NA - SANTA-CRUZ [COUNTY] CALIFORNIA BEACH EROSION CONTROL STUDY

NA - BEACH EROSION CONTROL STUDY ST. JOHNS [COUNTY] FLORIDA

NA - BREVARO [COUNTY] FLORIDA

NA - DUVAL [COUNTY] FLORIDA

NA - DADE [COUNTY] FLORIDA

NA - PINELLAS [COUNTY] FLORIDA

NA - PALM-BEACH [COUNTY] FLORIDA FROM MARTIN COUNTY LINE TO LAKE-WORTH INLET AND FROM SOUTH-LAKE-WORTH INLET TO BROWARD COUNTY LINE BEACH EROSION CONTROL STUDY

PHOTOGRAPHS OF SARASOTA [COUNTY] FLORIDA SHOWING GROIN INSTALLATION

NA - PALM-BEACH [COUNTY] FROM LAKE-WORTH INLET TO SOUTH-LAKE-WORTH INLET FLORIDA BEACH EROSION CONTROL STUDY

NA - MANITOWOC [COUNTY] FROM TWO-RIVERS TO MANITOWOC WISCONSIN BEACH EROSION CONTROL STUDY

NA - PALM-BEACH [COUNTY] FLORIDA FROM MARTIN COUNTY LINE TO LAKE-WORTH INLET AND FROM SOUTH-LAKE-WORTH INLET TO BROWARD [COUNTY] LINE BEACH EROSION CONTROL STUDY

NA - PALM-BEACH COUNTY FLORIDA FROM MARTIN [COUNTY] LINE TO LAKE-WORTH INLET AND FROM SOUTH-LAKE-WORTH INLET TO BROWARD COUNTY LINE BEACH EROSION CONTROL STUDY

NA - BERRIEN [COUNTY] MICHIGAN BEACH EROSION CONTROL STUDY

NA - HARRISON [COUNTY] MISSISSIPPI BEACH EROSION CONTROL STUDY

NA - NIAGARA [COUNTY] NEW-YORK BEACH EROSION STUDY

COUNTY (CONTINUED)
 NA - APPENDIX IX - SHORE OF LAKE-ERIE IN LAKE [COUNTY] OHIO BEACH EROSION CONTROL STUDY
 NA - BEACH EROSION STUDY LAKE-MICHIGAN SHORE LINE OF MILWAUKEE [COUNTY] WISCONSIN
 NA - RACINE [COUNTY] WISCONSIN BEACH EROSION CONTROL STUDY
 COVER NA - CONSTRUCTION OF A HEAVY DUNE [COVER] BY ASPHALT BASALT METHOD ON THE ISLAND OF BORKUM
 CREEK NA - AREA 7 - HOUSATONIC RIVER TO ASH [CREEK] CONNECTICUT BEACH EROSION CONTROL STUDY
 DUBAI [CREEK] ENTRANCE
 NA - AREA 1 - ASH [CREEK] TO SAUGATUCK RIVER CONNECTICUT BEACH EROSION CONTROL STUDY
 CURRENTS TEST WITH SCALE MODELS TO DETERMINE THE EFFECT OF [CURRENTS] AND BREAKERS UPON A SANDY BEACH AND THE
 ADVANTAGEOUS INSTALLATION OF GROINS
 THE RELATION OF THE ACTION OF WAVES AND [CURRENTS] ON HEADLANDS TO THE CONTROL OF SHORE EROSION BY GROINS
 CURVED [CURVED] GROINS AND FORESHORE DEFENCE
 [CURVED] JETTIES SEA-WALLS BULKHEADS AND RETAINING WALLS
 DADE NA - [DADE] COUNTY FLORIDA
 DAMAGE RECENT STORM [DAMAGE] ALONG THE COASTS OF FLORIDA AND MISSISSIPPI
 DAMS NA - HYDRAULIC STRUCTURES (GROINS [DAMS] DYKES AND CANAL EMBANKMENTS) OF BITUMEN TYPE
 DANISH THE [DANISH] WESTCOAST - LITTORAL DRIFT PROBLEMS AND MEASURES AGAINST COAST EROSION
 DATA SOME [DATA] ON BEACH PROTECTION WORKS
 DECLINE NA - ORIGIN AND [DECLINE] OF THE ISLAND TRISCHEN
 DEFENCE CURVED GROINS AND FORESHORE [DEFENCE]
 COAST EROSION AND [DEFENCE]
 FUNDAMENTALS OF COAST EROSION AND [DEFENCE]
 COASTAL PROTECTION REVIEW OF METHODS FOR [DEFENCE]
 TIMBER IN THE CONSTRUCTION OF SEA [DEFENCE] AND RIVER WORKS
 LES OUVAGES DE [DEFENCE] CONTRE LA MER SUR LA COTE FRANCAISE DE LOCEAN ENTRE LA LOIRE ET LA GIRONDE
 SEA [DEFENCE] EROSION AND PROTECTION ON A SANDY COAST
 NA - SEA [DEFENCE] GROYNES
 NA - SEA [DEFENCE] GROYNES - 4
 COASTAL [DEFENCE] WORKS
 SOME SEA [DEFENCE] WORKS FOR RECLAIMED LANDS
 NA - SEA [DEFENCE] WORKS - GROINS AND REVETMENTS
 DEFENCE PROBLEMS DE [DEFENCE] DES COTES RESUSITE DE ECHECS DE QUELQUES OUVRAGES
 DELAWARE NA - [DELAWARE] COAST FROM KITTS-HUMMOCK TO FENWICK ISLAND BEACH EROSION CONTROL STUDY
 DELAWARE-BAY NA - NEW-JERSEY COAST OF [DELAWARE-BAY] FROM CAPE-MAY-CANAL TO MAURICE RIVER BEACH EROSION CONTROL STUDY
 DELFTLAND NA - REPORT ON THE USE OF ASPHALT AT GROIN CONSTRUCTION IN [DELFTLAND] (HOLLAND)
 DESIGN VARIATIONS IN GROIN [DESIGN]
 VARIATIONS IN GROIN [DESIGN]
 SHORE PROTECTION PLANNING AND [DESIGN]
 [DESIGN] AND CONSTRUCTION OF GROINS
 [DESIGN] AND CONSTRUCTION OF THE SEAL-BEACH GROIN
 SUMMARY STATEMENT CONCERNING IMPORTANCE OF A GROIN [DESIGN] CRITERION

DESIGN (CONTINUED)
 NA - SWELL AND SURGE AS BASIS FOR PLANNING AND [DESIGN] IN SEA STRUCTURES AND COASTAL PROTECTION
 NA - A SCIENTIFIC BASIS FOR [DESIGN] OF GROUYNE SYSTEMS
 5800GR0007
 6100GR0002

DETAIL [DETAIL] OF CONCRETE BLOCK USED IN GROINS CONSTRUCTED AT MONTECITO CALIFORNIA
 2902GR0001

DETERIORATION [DETERIORATION] OF STEEL SHEET PILE GROINS AT PALM-BEACH FLORIDA
 4910GR0001

DEUTSCHEN NA - ALLGEMEINE EMPFEHLUNGEN FUR DEN [DEUTSCHEN] KUSTENSCHUTZ
 5500GR0002

DEVELOPMENT [DEVELOPMENT] AND COASTAL PROTECTION
 COASTAL STUDY OF THE EFFECT OF GROINS ON THE RATE OF LITTORAL TRANSPORT EQUIPMENT [DEVELOPMENT] AND INITIAL
 LABORATORY STUDY OF THE EFFECT OF GROINS ON THE RATE OF LITTORAL TRANSPORT EQUIPMENT [DEVELOPMENT] AND INITIAL
 TESTS
 5511GR0001

NA - BEACH EROSION AND COASTAL [DEVELOPMENT] IN THE CANTERBURY-BIGHT
 NA - THE EFFECT OF ISLAND PROTECTIVE STRUCTURES ON BEACH [DEVELOPMENT] IN WEST PART OF NORDERNEY
 COAST EROSION AND THE [DEVELOPMENT] OF BEACH PROFILES
 5906GR0001
 5500GR0008
 5406GR0001

THE [DEVELOPMENT] OF COAST PROFILES ON A RECEIVING COAST PROTECTED BY GROYNES
 NA - ORIGIN AND [DEVELOPMENT] OF ISLAND PROTECTIVE WORKS ON NORDERNEY
 6008GR0002
 5500GR0006
 6510GR0004
 5210GR0005
 3610GR0001

LITTORAL PROCESSES AND THE [DEVELOPMENT] OF SHORELINES
 [DEVELOPMENT] OF THE NEW-JERSEY SHORE
 CALIFORNIA'S BEACH EROSION AND [DEVELOPMENT] PROBLEMS
 3604GR0001
 3710GR0001

DISCUSSION
 ROUND-TABLE [DISCUSSION] OF SHORE PROBLEMS IN RELATION TO RECREATION
 6809GR0006
 6805GR0001

DISTRIBUTION
 ROUND-TABLE [DISCUSSION] OF SHORE PROBLEMS IN RELATION TO RECREATION
 CLIFF DRAINAGE AND BEACH [DISTRIBUTION]
 EFFECT OF PARTICLE SIZE AND [DISTRIBUTION] ON STABILITY OF ARTIFICIALLY FILLED BEACH PRESQUE-ISLE PENINSULA
 PENNSYLVANIA
 5510GR0002

DIVISION [DIVISION] OF SHORE EROSION - OHIO
 6809GR0006

DRAINAGE [DIVISION] OF SHORE EROSION - OHIO
 CLIFF [DRAINAGE] AND BEACH DISTRIBUTION
 5510GR0002

DRIIFT PROTECTION OF COASTS AGAINST THE SEA WITH OR WITHOUT PREPUNERATING COASTAL [DRIIFT] OF MATERIALS
 LITTORAL [DRIIFT] PROBLEM AT SHORE-LINE HARBORS
 THE DANISH WESTCOAST - LITTORAL [DRIIFT] PROBLEMS AND MEASURES AGAINST COAST EROSION
 5202GR0001
 6207GR0001
 7009GR0001
 6810GR0001
 6508GR0001
 3306GR0001
 6600GR0001

DUBAI [DUBAI] CREEK ENTRANCE
 NA - CONSTRUCTION OF A HEAVY [DUNE] COVER BY ASPHALT BASALT METHOD ON THE ISLAND OF BORKUM
 NA - [DUNE] PROTECTIVE WORKS ON SYLT
 5700GR0005
 5800GR0003

DURABLE [DURABILITY] OF STEEL SHEET PILING IN SHORE STRUCTURES
 DURBIN THE NEARSHORE MOVEMENT OF SAND AT [DURBIN]
 5202GR0001

DUTCH THE HISTORY OF THE [DUTCH] COAST IN THE LAST CENTURY
 A MATHEMATICAL THEORY ABOUT SAND WAVES AND ITS APPLICATION ON THE [DUTCH] WADDEN ISLE OF VLIELAND
 6207GR0001
 7009GR0001
 6810GR0001

DUVAL NA - [DUVAL] COUNTY FLORIDA
 DUJ-PLAT-TAYLOR [DUJ-PLAT-TAYLOR] ADJUSTABLE SCREW PILE GROYNES
 6508GR0001
 3306GR0001

DYED SEA GROINS EFFECTIVENESS INVESTIGATIONS BY [DYED] SAND TESTS
 6600GR0001

DYKES NA - HYDRAULIC STRUCTURES (GROINS DAMS [DYKES] AND CANAL EMBANKMENTS) OF BITUMEN TYPE
 NA - MODEL TESTS OF WAVE RUN-UP ON SEA [DYKES] IN WATT REGION
 5300GR0004
 5400GR0004

DYNAMICS	NA - GENERAL COASTAL (DYNAMICS) AND COASTAL PROTECTION OF THE SOUTH BALTIC-SEA BETWEEN TRAVE AND SWINE	5400GR0005
	NA - SOME IDEAS ON THE PROBLEM OF RESEARCH IN COASTAL (DYNAMICS) AND MODEL TESTS OF COASTAL PROTECTION	5600GR0001
	ONE ASPECT OF THE (DYNAMICS) OF A COAST PARTLY PROTECTED BY A ROW OF GROYNES	0000GR0001
	THE (DYNAMICS) OF A COAST WITH A GROUYNE SYSTEM	6809GR0001
	THE (DYNAMICS) OF A COAST WITH A GROUYNE SYSTEM	7009GR0008
	THE COASTAL (DYNAMICS) OF SAND WAVES AND THE INFLUENCE OF BREAKWATERS AND GROYNES	0000GR0002
EARLY	EARLY (EARLY) ATTEMPTS AT INLET CONSTRUCTION ON THE FLORIDA EAST COAST	3807GR0001
EAST	EARLY ATTEMPTS AT INLET CONSTRUCTION ON THE FLORIDA (EAST) COAST	3807GR0001
	COAST PROTECTION SOME RECENT WORKS ON THE (EAST) COAST 1942-52	5306GR0001
	NA - ISLAND PROTECTION ON (EAST) FRIESIAN COAST	5600GR0003
	NA - GROINS WITH ASPHALT GROUT IN (EAST) FRIESIAN COAST REGION	5900GR0002
	NA - AREA 2 - HAMMUNASSET RIVER TO (EAST) RIVER CONNECTICUT BEACH EROSION CONTROL STUDY	5002GR0001
	NA - AREA 9 (EAST) RIVER TO NEW-HAVEN HARBOR CONNECTICUT BEACH EROSION CONTROL STUDY	5605GR0002
	NA - ATLANTIC COAST OF NEW-YORK-CITY FROM (EAST) ROCKAWAY INLET TO ROCKAWAY INLET AND JAMAICA-BAY NEW-YORK	6506GR0001
ECHECS	PROBLEMS DE DEFENSE DES COTES RESUSSITE DE (ECHECS) DE QUELQUES OUVRAGES	5409GR0003
ECONOMY	NA - MANUAL OF WATER (ECONOMY)	5800GR0006
	NA - WATER (ECONOMY) BETWEEN NORTH AND BALTIC-SEA KIEL	5100GR0001
	NA - WATER (ECONOMY) BETWEEN NORTH-SEA AND BALTIC-SEA	5800GR0005
	NA - WHAT WATER (ECONOMY) EXPECTS FROM COASTAL RESEARCH	5500GR0004
	HOW TO BUILD A BEACH AT (ECONOMY) PRICES	5509GR0001
EFFECT	AN EXPERIMENTAL STUDY ON THE (EFFECT) OF COASTAL GROINS	5810GR0001
	TEST WITH SCALE MODELS TO DETERMINE THE (EFFECT) OF CURRENTS AND BREAKERS UPON A SANDY BEACH AND THE ADVANTAGEOUS INSTALLATION OF GROINS	2806GR0001
	LABORATORY STUDY OF THE (EFFECT) OF GROINS ON THE RATE OF LITTORAL TRANSPORT EQUIPMENT DEVELOPMENT AND INITIAL TESTS	5906GR0001
	THE (EFFECT) OF GROYNES ON ERODED BEACHES	7009GR0005
	NA - THE (EFFECT) OF GROYNES ON STABLE BEACHES	6809GR0002
	NA - THE (EFFECT) OF ISLAND PROTECTIVE STRUCTURES ON BEACH DEVELOPMENT IN WEST PART OF NORDERNEY	5500GR0008
	(EFFECT) OF PARTICLE SIZE AND DISTRIBUTION ON STABILITY OF ARTIFICIALLY FILLED BEACH PRESQUE-ISLE PENINSULA PENNSYLVANIA	6805GR0001
EFFECTIVENESS	SEA GROINS (EFFECTIVENESS) INVESTIGATIONS BY DYED SAND TESTS	6600GR0001
	(EFFECTIVENESS) OF GROINS AT ROCKAWAY-BEACH LONG-ISLAND NEW-YORK	3812GR0001
	(EFFECTIVENESS) OF PERNEARLE TYPE GROINS USED FOR BEACH PROTECTION AT SHOREWOOD WISCONSIN AND OTHER CITIES ALONG THE WEST SHORE OF LAKE-MICHIGAN	3911GR0001
	NA - AN INVESTIGATION INTO THE (EFFECTIVENESS) OF VARIOUS TYPES OF GROYNES ON SEAFORD-BEACH	6300GR0001
EFFECTS	SCALE (EFFECTS) IN MODELS WITH LITTORAL SAND DRIFT	6008GR0001
	NA - (EFFECTS) OF COASTAL PROTECTIVE STRUCTURES ON SYLT	5700GR0011
	NA - ON THE (EFFECTS) OF GROINS	5511GR0006
	(EFFECTS) OF LARGE STRUCTURES ON THE OHIO SHORE OF LAKE-ERIE	6400GR0002
	GROINS AND (EFFECTS) - MINIMIZING LIABILITIES	6510GR0003
ELLENBOGENS	NA - DIE ABRUCHURSACHEN AN DER NORDWESTKUSTE DES (ELLENBOGENS) AUF SYLT	5700GR0008
EMBANKMENTS	NA - HYDRAULIC STRUCTURES (GROINS DAMS DYKES AND CANAL (EMBANKMENTS)) OF BITUMEN TYPE	5300GR0004
EMERGENCY	(EMERGENCY) MEASURES TO COMBAT BEACH EROSION	6306GR0002
	(EMERGENCY) METHODS TO COMBAT BEACH EROSION	6504GR0001
EMPFEHLUNGEN	NA - ALLGEMEINE (EMPFEHLUNGEN) FUR DEN DEUTSCHEN KUSTENSCHUTZ	5500GR0002

ENGINEERING
 OCEANOGRAPHICAL [ENGINEERING]
 BITUMEN IN COASTAL [ENGINEERING]
 NA - SUITABILITY OF MODEL TESTS IN MARITIME [ENGINEERING] IN HARBORS SEAWAYS AND COASTAL PROTECTION
 SOME COASTAL [ENGINEERING] PROBLEMS IN INDIA
 COASTAL [ENGINEERING] STRUCTURES
 COASTAL [ENGINEERING] STUDY AT POMPAHO-BEACH
 APPLICATION OF ASPHALT IN HYDRAULIC [ENGINEERING] WORKS
 ENGINEERS
 BEACH PROTECTION [ENGINEERS] ATTEMPT TO OUTFIT NATURE AT PRESQUE-ISLE PENINSULA
 ENTRANCE
 DUBAI CREEK [ENTRANCE]
 ENTRE
 LES OUVAISES DE DEFENCE CONTRE LA MER SUR LA COTE FRANCAISE DE LOCEAN [ENTRE] LA LOIRE ET LA GIRONDE
 ENTWASSERUNG
 NA - SCHUTZ UND ENTWASSERUNG DER NIEUERUNGSGEBIETE AN DER SCHLESWIG-HOLSTEINISCHEN OSTSEEKUSTE
 EQUIPMENT
 LABORATORY STUDY OF THE EFFECT OF GROINS ON THE RATE OF LITTORAL TRANSPORT [EQUIPMENT] DEVELOPMENT AND INITIAL TESTS
 ERIE
 NA - PRESQUE-ISLE PENINSULA [ERIE] PENNSYLVANIA BEACH EROSION CONTROL STUDY
 NA - PRESQUE-ISLE PENINSULA [ERIE] PENNSYLVANIA BEACH EROSION CONTROL STUDY
 ERODED
 THE EFFECT OF GROYNES ON [ERODED] BEACHES
 EROSAO
 NA - PROTECCAO DA COSTA CONTRA A [EROSAO] MARITIMA E FORMACAO DE PRAIAS DE ARCIA - DOIS PROBLEMAS NA COSTA DE MOCAMBIQUE
 EROSION
 EMERGENCY MEASURES TO COMBAT BEACH [EROSION]
 EMERGENCY METHODS TO COMBAT BEACH [EROSION]
 COAST [EROSION]
 THE DANISH WESTCOAST - LITTORAL DRIFT PROBLEMS AND MEASURES AGAINST COAST [EROSION]
 THE PROBLEM OF COAST [EROSION]
 THE PREVENTION OF COAST [EROSION]
 COAST [EROSION]
 THE PREVENTION OF COAST [EROSION]
 SAND MOVEMENT AND BEACH [EROSION]
 NA - PERMEABLE GROINS OF CONCRETE CHECK BEACH [EROSION]
 STUDY OF [EROSION] ALONG HUNER SPIT AND VICINITY KACHEMAK-BAY ALASKA
 PAPER ON PROTECTIVE WORKS ADAPTED TO LIMIT [EROSION] ALONG THE OPEN COAST HOW THEY WORK
 NA - CAUSES OF COAST [EROSION] AND ACCRETION
 SHORE [EROSION] AND CABBAGE PALMETTO GROINS AT NORTH POINT ST.AUGUSTINE FLORIDA
 NA - BEACH [EROSION] AND COASTAL DEVELOPMENT IN THE CANTERBURY-BIGHT
 COAST [EROSION] AND DEFENCE
 FUNDAMENTALS OF COAST [EROSION] AND DEFENCE
 CALIFORNIA'S BEACH [EROSION] AND DEVELOPMENT
 COAST [EROSION] AND FOPESHORE PROTECTION
 [EROSION] AND PALMETTO GROINS AT NORTH POINT ST.AUGUSTINE FLORIDA
 SEA DEFENCE [EROSION] AND PROTECTION ON A SANDY COAST
 COAST [EROSION] AND PROTECTION ON LONG-ISLAND AND NEW-JERSEY
 BEACH [EROSION] AND PROTECTION WORKS IN IMAZU-SAKANO-BEACH
 COAST [EROSION] AND PROTECTION - STUDIES IN CAUSES AND REMEDIES
 REVIEW OF BEACH [EROSION] AND STORM TIDE CONDITIONS IN FLORIDA 1961-1962
 COAST [EROSION] AND THE DEVELOPMENT OF BEACH PROFILES
 NA - BEACH [EROSION] AT COMPU-BEACH WESTPORT CONNECTICUT
 NA - BEACH [EROSION] AT FOLLY-BEACH SOUTH-CAROLINA
 NA - BEACH [EROSION] AT GALVESTON TEXAS

EROSION

(CONTINUED)

MEASURES AGAINST [EROSION] AT GROINS AND JETTIES
 NA - BEACH [EROSION] AT HOLLYWOOD-BEACH FLORIDA
 NA - BEACH [EROSION] AT JACOB-HITS PARK LONG-ISLAND NEW-YORK
 NA - BEACH [EROSION] AT MANASQUAN INLET NEW-JERSEY AND ADJACENT BEACHES
 NA - BEACH [EROSION] AT MANASQUAN INLET NEW-JERSEY AND ADJACENT BEACHES
 NA - BEACH [EROSION] AT SANTA-BARBARA CALIFORNIA
 NA - BEACH [EROSION] AT TILGHMAN POINT MARYLAND
 NA - BEACH [EROSION] AT WILLOUGHBY SPIT VIRGINIA
 THE RELATION OF THE ACTION OF WAVES AND CURRENTS ON HEADLANDS TO THE CONTROL OF SHORE [EROSION] BY GROINS
 A NEW METHOD OF CONSTRUCTION IN COAST [EROSION] CONTROL
 MAN AGAINST THE SEA A GUIDE TO [EROSION] CONTROL
 THE BUDD HORIZONTALLY PERMEABLE GROIN SYSTEM FOR BEACH [EROSION] CONTROL AND REBUILDING SAND BEACHES
 [EROSION] CONTROL AT WHITESVILLE-LOUISIANA
 [EROSION] CONTROL IN NEW-ENGLAND
 NA - BEACH [EROSION] CONTROL REPORT ON COOPERATIVE STUDY OF VIRGINIA AND BISCAYNE KEYS FLORIDA
 ASPHALT IN BEACH [EROSION] CONTROL STRUCTURES
 NA - SAN-GABRIEL RIVER TO NEWPORT-BAY ORANGE COUNTY CALIFORNIA APPENDIX V PHASE II BEACH [EROSION] CONTROL STUDY
 NA - AMELIA ISLAND FLORIDA BEACH [EROSION] CONTROL STUDY
 NA - AREAS 8 AND 11 SAUGATUCK RIVER TO BYHAM RIVER CONNECTICUT BEACH [EROSION] CONTROL STUDY
 NA - SAN-JUAN PUERTO-RICO BEACH [EROSION] CONTROL STUDY
 NA - SANTA-CRUZ COUNTY CALIFORNIA BEACH [EROSION] CONTROL STUDY
 NA - SHORE OF NEW-JERSEY FROM SANDY-HOOK TO BARNEGAT INLET BEACH [EROSION] CONTROL STUDY
 NA - PALM-BEACH COUNTY FROM LAKE-WORTH INLET TO SOUTH-LAKE-NORTH INLET FLORIDA BEACH [EROSION] CONTROL STUDY
 NA - APPENDIX VI HUMBOLDT-BAY (BURNIE POINT) CALIFORNIA BEACH [EROSION] CONTROL STUDY
 NA - WAIKIKI-BEACH OAHU HAWAII BEACH [EROSION] CONTROL STUDY
 NA - CHATHAM MASSACHUSETTS BEACH [EROSION] CONTROL STUDY
 NA - SHORE OF NEW-JERSEY - BARNEGAT INLET TO CAPE-MAY-CANAL BEACH [EROSION] CONTROL STUDY
 NA - SHORE OF THE STATE OF NEW-HAMPSHIRE BEACH [EROSION] CONTROL STUDY
 NA - VIRGINIA-BEACH VIRGINIA COOPERATIVE BEACH [EROSION] CONTROL STUDY
 NA - THAMES RIVER TO NIANTIC-HAY CONNECTICUT BEACH [EROSION] CONTROL STUDY
 NA - CLARK POINT NEW-BEDFORD MASSACHUSETTS BEACH [EROSION] CONTROL STUDY
 NA - SOUTH-KINGSTON AND WESTERLY RHODE-ISLAND BEACH [EROSION] CONTROL STUDY
 NA - PERTH-AMBOY NEW-JERSEY BEACH [EROSION] CONTROL STUDY
 NA - STATION ISLAND FORT-WAUDSWORTH TO ARTHUR-KILL NEW-YORK BEACH [EROSION] CONTROL STUDY
 NA - DELAWARE COAST FROM KITTS-HUMMOCK TO FENWICK ISLAND BEACH [EROSION] CONTROL STUDY
 NA - BERRIEN COUNTY MICHIGAN BEACH [EROSION] CONTROL STUDY
 NA - HALIWA-BEACH OAHU HAWAII BEACH [EROSION] CONTROL STUDY
 NA - NEW-JERSEY COAST OF DELAWARE-BAY FROM CAPE-MAY-CANAL TO MAURICE RIVER BEACH [EROSION] CONTROL STUDY
 NA - SAN-DIEGO COUNTY CALIFORNIA APPENDIX IV PHASE 2 BEACH [EROSION] CONTROL STUDY
 NA - BELLE-PASS TO RACCOON POINT LOUISIANA BEACH [EROSION] CONTROL STUDY
 NA - COAST OF SOUTHERN CALIFORNIA - SPECIAL INTERIM REPORT ON THE VENTURA AREA COOPERATIVE BEACH [EROSION] CONTROL STUDY
 NA - PALM-BEACH COUNTY FLORIDA FROM MARTIN COUNTY LINE TO LAKE-WORTH INLET AND FROM SOUTH-LAKE-NORTH INLET TO BROWARD COUNTY LINE BEACH [EROSION] CONTROL STUDY
 NA - CITY OF EVANSTON ILLINOIS BEACH [EROSION] CONTROL STUDY
 NA - ATLANTIC-CITY NEW-JERSEY BEACH [EROSION] CONTROL STUDY
 NA - LAKE-ERIE SHORE LINE FROM THE MICHIGAN - OHIO STATE LINE TO MARBLEHEAD OHIO BEACH [EROSION] CONTROL STUDY
 NA - SHORE BETWEEN PEMBERTON POINT AND CAPE-COD MASSACHUSETTS BEACH [EROSION] CONTROL STUDY
 NA - ILLINOIS SHORE OF LAKE-MICHIGAN BEACH [EROSION] CONTROL STUDY
 NA - APPENDIX IV OHIO SHORE LINE OF LAKE-ERIE SANDUSKY TO VERMILLION OHIO BEACH [EROSION] CONTROL STUDY
 NA - WAIKIKI-BEACH ISLAND OF OAHU T. H. BEACH [EROSION] CONTROL STUDY
 NA - REVERE-BEACH MASSACHUSETTS BEACH [EROSION] CONTROL STUDY

5210GR0001
 3705GR0001
 3801GR0001
 3801GR0002
 3701GR0001
 4005GR0001
 4005GR0001
 3801GR0003
 4300GR0001
 3507GR0001
 0000GR0009
 0000GR0006
 4010GR0001
 5604GR0001
 6910GR0001
 6209GR0004
 6204GR0003

6210GR0002
 6105GR0002
 5705GR0003
 6209GR0001
 5705GR0004
 5802GR0004
 5712GR0004
 5705GR0001
 6503GR0003
 5704GR0001
 5908GR0001
 6205GR0003
 6204GR0005
 5801GR0001
 6209GR0003
 5809GR0001
 6505GR0002
 6505GR0001
 5707GR0001
 5802GR0001
 6503GR0004
 6105GR0004
 6009GR0001
 6202GR0001
 6205GR0002

6105GR0002
 6505GR0003
 6407GR0002
 6205GR0001
 6101GR0002
 5910GR0001
 5210GR0002
 5210GR0005
 5308GR0001
 5105GR0001

EROSION

(CONTINUED)

- NA - APPENDIX XI OHIO SHORE LINE OF LAKE-ERIE EUCLID TO CHAGRIN RIVER BEACH [EROSION] CONTROL STUDY
- NA - PRESQUE-ISLE PENINSULA ERIE PENNSYLVANIA BEACH [EROSION] CONTROL STUDY
- NA - MANITOWOC COUNTY FROM TWO-RIVERS TO MANITOWOC WISCONSIN BEACH [EROSION] CONTROL STUDY
- NA - APPENDICES III VII AND XII OHIO SHORE LINE OF LAKE-ERIE BETWEEN FAIRPORT AND ASHTABULA BEACH [EROSION] CONTROL STUDY
- NA - AREA 2 HAMMONSETT RIVER TO EAST RIVER CONNECTICUT BEACH [EROSION] CONTROL STUDY
- NA - PRESQUE-ISLE PENINSULA ERIE PENNSYLVANIA BEACH [EROSION] CONTROL STUDY
- NA - HAMLIN-BEACH STATE-PARK NEW-YORK BEACH [EROSION] CONTROL STUDY
- NA - SHORE OF NEW-JERSEY FROM SANDY-HOOK TO BARNEGAT INLET BEACH [EROSION] CONTROL STUDY
- NA - SELKIRK-SHORES STATE-PARK NEW-YORK BEACH [EROSION] CONTROL STUDY
- NA - AREA 7 - HOUSATONIC RIVER TO ASH CREEK CONNECTICUT BEACH [EROSION] CONTROL STUDY
- NA - AREA 5 PAMCATUCK RIVER TO THAMES RIVER CONNECTICUT BEACH [EROSION] CONTROL STUDY
- NA - PINELLAS COUNTY FLORIDA BEACH [EROSION] CONTROL STUDY
- NA - AREA 1 - ASH CREEK TO SAUGATUCK RIVER CONNECTICUT BEACH [EROSION] CONTROL STUDY
- NA - COLONIAL-BEACH VIRGINIA BEACH [EROSION] CONTROL STUDY
- NA - FAIR-HAVEN-BEACH STATE-PARK NEW-YORK BEACH [EROSION] CONTROL STUDY
- NA - QUINCY-SHORE-BEACH MASSACHUSETTS BEACH [EROSION] CONTROL STUDY
- NA - APPENDICES V AND X OHIO SHORE LINE OF LAKE-ERIE BETWEEN ASHTABULA AND THE PENNSYLVANIA STATE LINE BEACH [EROSION] CONTROL STUDY
- NA - GULF SHORE OF GALVESTON ISLAND TEXAS BEACH [EROSION] CONTROL STUDY
- NA - OCEANSIDE OCEAN-BEACH IMPERIAL-BEACH AND CORONADO SAN-DIEGO COUNTY CALIFORNIA BEACH [EROSION] CONTROL STUDY
- NA - APPENDIX VIII OHIO SHORE LINE OF LAKE-ERIE BETWEEN VERMILLION AND SHEFFIELD-LAKE-VILLAGE BEACH [EROSION] CONTROL STUDY
- NA - APPENDIX IV OHIO SHORE LINE OF LAKE-ERIE SANDUSKY BAY OHIO BEACH [EROSION] CONTROL STUDY
- NA - SANTA-BARBARA CALIFORNIA BEACH [EROSION] CONTROL STUDY
- NA - SOUTH SHORE STATE OF RHODE-ISLAND BEACH [EROSION] CONTROL STUDY
- NA - PUNTA-LAS-MARIAS SAN-JUAN P. R. BEACH [EROSION] CONTROL STUDY
- NA - AREA 9 EAST RIVER TO NEW-HAVEN HARBOR CONNECTICUT BEACH [EROSION] CONTROL STUDY
- NA - CLEVELAND AND LAKEWOOD OHIO BEACH [EROSION] CONTROL STUDY
- NA - APPENDIX I COAST OF CALIFORNIA CARPENTERIA TO POINT MUGU BEACH [EROSION] CONTROL STUDY
- NA - APPENDIX II COAST OF CALIFORNIA POINT MUGU TO SAN-PEDRO BREAKWATER BEACH [EROSION] CONTROL STUDY
- NA - PLUM ISLAND MASSACHUSETTS BEACH [EROSION] CONTROL STUDY
- NA - CITY OF KENOSHA WISCONSIN BEACH [EROSION] CONTROL STUDY
- NA - ATLANTIC-CITY NEW-JERSEY BEACH [EROSION] CONTROL STUDY
- NA - VIRGINIA-BEACH VIRGINIA BEACH [EROSION] CONTROL STUDY
- NA - FIRE-ISLAND INLET TO JONES INLET LONG-ISLAND NEW-YORK COOPERATIVE BEACH [EROSION] CONTROL STUDY
- NA - AREA 4 - CONNECTICUT RIVER TO HAMMONSETT RIVER CONNECTICUT BEACH [EROSION] CONTROL STUDY
- NA - AREA 3 - NEW-HAVEN HARBOR TO HOUSATONIC RIVER CONNECTICUT BEACH [EROSION] CONTROL STUDY
- NA - AREA 6 - ATLANTIC-BAY TO CONNECTICUT RIVER CONNECTICUT BEACH [EROSION] CONTROL STUDY
- NA - RACINE COUNTY WISCONSIN BEACH [EROSION] CONTROL STUDY
- NA - WAIMEA-BEACH AND HANAPEPE-BAY ISLAND OF KAUAI T. H. BEACH [EROSION] CONTROL STUDY
- NA - HAMPTON-BEACH NEW-HAMPSHIRE BEACH [EROSION] CONTROL STUDY
- NA - WINTHROP-BEACH MASSACHUSETTS
- NA - GRAND-ISLE LOUISIANA BEACH
- NA - OCEAN-CITY NEW-JERSEY BEACH
- NA - APPENDIX XIV OHIO SHORE LINE OF LAKE-ERIE SHEFFIELD-LAKE-VILLAGE TO ROCKY RIVER BEACH [EROSION] CONTROL STUDY
- NA - APPENDIX IX - SHORE OF LAKE-ERIE IN LAKE COUNTY OHIO BEACH [EROSION] CONTROL STUDY
- NA - REVERE-BEACH MASSACHUSETTS BEACH [EROSION] CONTROL STUDY
- NA - HARRISON COUNTY MISSISSIPPI BEACH [EROSION] CONTROL STUDY
- NA - BEACH [EROSION] CONTROL STUDY ST. JOHNS COUNTY FLORIDA
- NA - CERTAIN POINTS ABOUT [EROSION] COSTS AND MEASURES OF PROTECTION
- NA - COAST [EROSION] IN GREAT-BRITAIN
- NA - [EROSION] OF OUR COASTAL FRONTIERS
- NA - [EROSION] OF OUR COASTAL FRONTIERS - PART II

EROSION	(CONTINUED)	0000GR0003
INFLUENCE OF PROTECTIVE WORKS ON THE [EROSION] OF THE WEST COAST OF SYLT NORTH-SEA COAST OF GERMANY		5204GR0001
[EROSION] PROBLEMS ON THE OHIO SHORE OF LAKE-ERIE		5300GR0001
LAKE-MICHIGAN [EROSION] STUDIES		3901GR0001
BEACH [EROSION] STUDIES		4000GR0002
BEACH [EROSION] STUDIES		4000GR0001
NA - JUPITER ISLAND FLORIDA BEACH [EROSION] STUDY		4812GR0007
NA - ANNA-MARIA AND LONGBOAT KEYS FLORIDA BEACH [EROSION] STUDY		4812GR0004
NA - PALM-BEACH FLORIDA BEACH [EROSION] STUDY		4812GR0005
NA - NORTH-CAROLINA SHORE LINE BEACH [EROSION] STUDY		4812GR0001
NA - NIAGARA COUNTY NEW-YORK BEACH [EROSION] STUDY		4308GR0001
NA - BEACH [EROSION] STUDY CORONADO CALIFORNIA		4202GR0001
NA - BEACH [EROSION] STUDY LAKE-ERIE SHORE LINE IN THE VICINITY OF HURON OHIO		4505GR0001
NA - BEACH [EROSION] STUDY LAKE-MICHIGAN SHORE LINE OF MILWAUKEE COUNTY WISCONSIN		4604GR0001
NA - BEACH [EROSION] STUDY OF BAKERS-HAULOVER INLET FLORIDA		4604GR0002
NA - BEACH [EROSION] STUDY OHIO SHORE LINE OF LAKE-ERIE FROM OHIO - MICHIGAN STATE LINE TO MARBLEHEAD OHIO		4505GR0002
NA - BEACH [EROSION] STUDY ORANGE COUNTY CALIFORNIA		4002GR0001
NA - BEACH [EROSION] STUDY ST. SIMON ISLAND GEORGIA		4010GR0002
DIVISION OF SHORE [EROSION] - OHIO		5510GR0002
EUCLID		5402GR0001
NA - APPENDIX XI OHIO SHORE LINE OF LAKE-ERIE (EUCLID) TO CHAGRIN RIVER BEACH EROSION CONTROL STUDY		5402GR0001
EVANSTON		6505GR0003
NA - CITY OF (EVANSTON) ILLINOIS BEACH EROSION CONTROL STUDY		6505GR0003
EXPERIENCE		6707GR0001
SHORE PROTECTION [EXPERIENCE] IN THE UNITED-STATES		6307GR0002
REVIEW OF GERMAN [EXPERIENCE] ON COASTAL PROTECTION BY GROINS		
EXPERIMENT		7105GR0001
(EXPERIMENT) IN SHORE PROTECTION		
EXPERIMENTAL		5309GR0001
(EXPERIMENTAL) GROINS CAMP-PERRY OHIO		4800GR0001
(EXPERIMENTAL) STEEL SHEET PILE GROINS PALM-BEACH FLORIDA		7009GR0003
(EXPERIMENTAL) STUDY OF THE HYDRAULIC BEHAVIOR OF INCLINED GROYNES SYSTEMS		6809GR0003
(EXPERIMENTAL) STUDY OF THE HYDRAULIC BEHAVIOR OF GROYNES SYSTEMS		5810GR0001
AN [EXPERIMENTAL] STUDY ON THE EFFECT OF COASTAL GROINS		
FAIRFIELD		5705GR0002
PHOTOGRAPHS OF SASCO-HILL-BEACH (FAIRFIELD) CONNECTICUT AFTER GROIN CONSTRUCTION AND BEFORE FILL PLACEMENT		
FAIRPORT		5201GR0002
NA - APPENDIXES III VII AND XII OHIO SHORE LINE OF LAKE-ERIE BETWEEN (FAIRPORT) AND ASHTABULA BEACH EROSION CONTROL STUDY		5504GR0005
FAIR-HAVEN-BEACH		6407GR0003
NA - (FAIR-HAVEN-BEACH) STATE-PARK NEW-YORK BEACH EROSION CONTROL STUDY		3607GR0001
FALMOUTH		5803GR0001
NA - (FALMOUTH) MASSACHUSETTS		5700GR0009
FEDERAL		5700GR0010
PARTICIPATION OF (FEDERAL) RELIEF AGENCIES IN BEACH PROTECTION PROJECTS		5707GR000C
FEEDER		5504GR0002
:(FEEDER) BEACHES AND GROINS RESTORE PRESQUE-ISLE PENINSULA		7000GR0001
FEHMARN		
NA - KUSTENFORSCHUNGEN IM RAUM (FEHMARN) NORDWAGRIEN		
NA - BRANDUNGSUNTERSUCHUNGEN AN DEN KUSTEN VON (FEHMARN) UND NORDWAGRIEN		
FENWICK		
NA - DELAWARE COAST FROM KITTS-HUMMOCK TO (FENWICK) ISLAND BEACH EROSION CONTROL STUDY		
FERNANDINA-BEACH		
THE (FERNANDINA-BEACH) GROINS		
FIELDS		
COLORS SAND TESTS WITH LUMINESCENT SAND IN GROIN (FIELDS)		

FILL
BEHAVIOR OF BEACH (FILL) AND BORROW AREA AT PROSPECT-BEACH WEST-HAVEN CONNECTICUT
BEHAVIOR OF BEACH (FILL) AT OCEAN-CITY NEW-JERSEY
PHOTOGRAPHS OF CUMPO-BEACH WESTPORT CONNECTICUT AFTER GROIN CONSTRUCTION AND BEFORE (FILL) PLACEMENT
PHOTOGRAPHS OF SASCO-HILL-BEACH FAIRFIELD CONNECTICUT AFTER GROIN CONSTRUCTION AND BEFORE (FILL) PLACEMENT
FILLED
EFFECT OF PARTICLE SIZE AND DISTRIBUTION ON STABILITY OF ARTIFICIALLY (FILLED) BEACH PRESQUE-ISLE PENINSULA
PENNSYLVANIA
FILLING
(FILLING) PATTERN OF THE FORT-SHERIDAN GROIN SYSTEM
FILLS
BEACH REHABILITATION BY USE OF BEACH (FILLS) AND FURTHER PLANS FOR THE PROTECTION OF THE ISLAND OF NORDERNEY
BEHAVIOR OF BEACH (FILLS) IN NEW-ENGLAND
BEHAVIOR OF BEACH (FILLS) IN NEW-ENGLAND
FIRE-ISLAND
NA - ATLANTIC COAST OF LONG-ISLAND (FIRE-ISLAND) INLET AND SHORE WESTERLY TO JONES INLET NEW-YORK
NA - (FIRE-ISLAND) INLET TO JONES INLET LONG-ISLAND NEW-YORK COOPERATIVE BEACH EROSION CONTROL STUDY
FLACHKUSTEN
NA - UBER DEN EINFLUSS VON-STRANDBUHNEN AUF DIE SANDWANDERUNG AN (FLACHKUSTEN)
FLAT
NA - PROTECTION OF THE WEST BEACH OF SYLT ISLAND BY (FLAT) GROINS
FLOATING
NA - PROVISIONS FOR STABILIZATION AND MAINTENANCE OF (FLOATING) ISLANDS OF THE SOUTH COAST OF GERMAN NORTH-SEA
FLOOD
NA - (FLOOD) PROTECTION AND COAST STABILIZATION
FLOOR
NA - MODEL TESTS WITH MOVEABLE (FLOOR) IN SEA AND SEA HARBOR CONSTRUCTION
FLORIDA
NA - PINELLAS COUNTY (FLORIDA)
NA - BREVARD COUNTY (FLORIDA)
NA - MULLET-KEY (FLORIDA)
COASTAL PROTECTION PROCEDURES WITH SPECIAL REFERENCE TO CONDITIONS IN (FLORIDA)
NA - BEACH EROSION CONTROL REPORT ON COOPERATIVE STUDY OF VIRGINIA AND BISCAYNE KEYS (FLORIDA)
NA - DADE COUNTY (FLORIDA)
COASTAL PROTECTION FOR (FLORIDA)
NA - BEACH EROSION CONTROL STUDY ST. JOHNS COUNTY (FLORIDA)
NA - DUVAL COUNTY (FLORIDA)
INFORMATION ON BEACH PROTECTION IN (FLORIDA)
DETERIORATION OF STEEL SHEET PILE GROINS AT PALM-BEACH (FLORIDA)
REPORT ON BEACH EROSION AT HOLLYWOOD-BEACH (FLORIDA)
NA - BEACH EROSION AT HOLLYWOOD-BEACH (FLORIDA)
EXPERIMENTAL STEEL SHEET PILE GROINS PALM-BEACH (FLORIDA)
NA - BEACH EROSION STUDY OF BAKERS-HADOVER INLET (FLORIDA)
EROSION AND PALMETTO GROINS AT NORTH POINT ST. AUGUSTINE (FLORIDA)
SHORE EROSION AND CABBAGE PALMETTO GROINS AT NORTH POINT ST. AUGUSTINE (FLORIDA)
RECENT STORM DAMAGE ALONG THE COASTS OF (FLORIDA) AND MISSISSIPPI
NA - AMELIA ISLAND (FLORIDA) BEACH EROSION CONTROL STUDY
NA - PALM-BEACH COUNTY FROM LAKE-WORTH INLET TO SOUTH-LAKE-WORTH INLET (FLORIDA) BEACH EROSION CONTROL STUDY
NA - PINELLAS COUNTY (FLORIDA) BEACH EROSION CONTROL STUDY
NA - JUPITER ISLAND (FLORIDA) BEACH EROSION STUDY
NA - ANNA-MARIA AND LONGBOAT KEYS (FLORIDA) BEACH EROSION STUDY
NA - PALM-BEACH (FLORIDA) BEACH EROSION STUDY
(FLORIDA) COASTAL PROBLEMS
EARLY ATTEMPTS AT INLET CONSTRUCTION ON THE (FLORIDA) EAST COAST
NA - PALM-BEACH COUNTY (FLORIDA) FROM MARTIN COUNTY LINE TO LAKE-WORTH INLET AND FROM SOUTH-LAKE-WORTH INLET TO BROWARD COUNTY LINE BEACH EROSION CONTROL STUDY
PHOTOGRAPHS OF SARASOTA COUNTY (FLORIDA) SHOWING GROIN INSTALLATION

FLORIDA	(CONTINUED)	
FLOW	REVIEW OF BEACH EROSION AND STORM TIDE CONDITIONS IN (FLORIDA) 1961-1962	6211GR0001
FLUSHING	NA - ON THE (FLOW) CHARACTERISTICS IN THE VICINITY OF GROINS	5511GR0004
FOLGERUNGEN	NA - ARTIFICIAL RESTORATION OF BEACHES WITH SPECIAL REGARD FOR BEACH (FLUSHING) NORDERNEY 1951-52	5700GR0014
FULLY-BEACH	NA - (FOLGERUNGEN) AUS UNTERSUCHUNGEN UBER KUSTENSCHUTZ/PROBLEME AUF SYLT	5700GR0007
FORESHORE-EROSION-	NA - BEACH EROSION AT (FULLY-BEACH) SOUTH-CAROLINA	3504GR0001
REPORT OF THE (FORESHORE-EROSION-HUANO)		3612GR0001
FORT-FISHER	REPORT OF THE (FORESHORE-EROSION-HUANO)	3201GR0001
FORT-MACON	NA - (FORT-FISHER) NORTH-CAROLINA	5400GR0001
FORT-SHERIDAN	PHOTOGRAPHS OF (FORT-MACON) NEAR MOREHEAD-CITY NORTH-CAROLINA AFTER SERIES OF HURRICANES IN 1954	6209GR0002
FORT-MAUSWORTH	NA - (FORT-MACON) - ATLANTIC-BEACH AND VICINITY NORTH-CAROLINA	5310GR0003
FRANCAISE	FILLING PATTERN OF THE (FORT-SHERIDAN) GROIN SYSTEM	6505GR0001
FRANCE	NA - STATEN ISLAND (FORT-MAUSWORTH) TO ARTHUR-KILL NEW-YORK BEACH EROSION CONTROL STUDY	5409GR0004
	LES OUVRAGES DE DEFENCE CONTRE LA MER SUR LA COTE (FRANCAISE) DE LOCEAN ENTRE LA LOIRE ET LA GIRONDE	3703GR0001
	COAST PROTECTION ON THE NORTH-SEA COASTS OF HOLLAND (FRANCE) BELGIUM AND GERMANY	5600GR0003
FRIESIAN	NA - ISLAND PROTECTION ON EAST (FRIESIAN) COAST	5900GR0002
FUNCTION	NA - GROINS WITH ASPHALT GROUT IN EAST (FRIESIAN) COAST REGION	6107GR0001
FUNCTIONS	A STUDY OF GROINS AND THEIR (FUNCTION) AS HYDRAULIC STRUCTURES	5700GR0002
FUNDAMENTALS	(FUNCTIONS) OF GROINS FUNDAMENTAL STUDY ON BEACH SEDIMENT AFFECTED BY GROINS (1)	5409GR0001
GABIONS	(FUNDAMENTALS) OF COAST EROSION AND DEFENCE	6512GR0001
	MARITIME AND RIPARIAN USE OF (GABIONS)	3807GR0002
GALVESTON	(GALVESTON) ISLAND SHORELINE AND THE PROTECTION OF GALVESTON-BEACH	5307GR0002
	NA - GULF SHORE OF (GALVESTON) ISLAND TEXAS BEACH EROSION CONTROL STUDY	3406GR0001
GALVESTON-BEACH	NA - BEACH EROSION AT (GALVESTON) TEXAS	3807GR0002
	GALVESTON ISLAND SHORELINE AND THE PROTECTION OF (GALVESTON-BEACH)	3807GR0005
GENERALITIES	PROTECTING (GALVESTON-BEACH)	3604GR0003
GEORGIA	(GALVESTON-BEACH) CONSTRUCTION	5903GR0003
GERMAN	(GENERALITIES) ON COASTAL PROCESSES AND PROTECTION	4010GR0002
	NA - BEACH EROSION STUDY ST. SIMON ISLAND (GEORGIA)	5700GR0004
GERMANY	REVIEW OF (GERMAN) EXPERIENCE ON COASTAL PROTECTION BY GROINS	0000GR0003
	NA - PROVISIONS FOR STABILIZATION AND MAINTENANCE OF FLOATING ISLANDS OF THE SOUTH COAST OF (GERMAN) NORTH-SEA	3703GR0001
GRAND-ISLE	INFLUENCE OF PROTECTIVE WORKS ON THE EROSION OF THE WEST COAST OF SYLT NORTH-SEA COAST OF (GERMANY)	5604GR0001
	COAST PROTECTION ON THE NORTH-SEA COASTS OF HOLLAND FRANCE BELGIUM AND (GERMANY)	
	BEACH EROSION CONTROL (GRAND-ISLE) LOUISIANA	
	NA - (GRAND-ISLE) LOUISIANA BEACH EROSION CONTROL STUDY	

GREAT-BRITAIN	COAST EROSION IN [GREAT-BRITAIN]	4204GR0001
GREAT-LAKES	GROINS ON THE SHORE OF THE [GREAT-LAKES]	6105GR0001
	GROINS ON THE SHORES OF THE [GREAT-LAKES]	6111GR0001
	LOW COST SHORE PROTECTION USED ON THE [GREAT-LAKES]	5310GR0001
	PRINCIPLES OF SHORE PROTECTION FOR THE [GREAT-LAKES]	5310GR0002
GROUT	NA - GROINS WITH ASPHALT [GROUT] IN EAST FRIESIAN COAST REGION	5900GR0002
GUIDE	MAN AGAINST THE SEA A [GUIDE] TO EROSION CONTROL	0000GR0009
GULF	NA - [GULF] SHORE OF GALVESTON ISLAND TEXAS BEACH EROSION CONTROL STUDY	5307GR0002
HALEIWA-BEACH	NA - [HALEIWA-BEACH] OAHU HAWAII BEACH EROSION CONTROL STUDY	6503GR0004
HAMLIN-BEACH	NA - [HAMLIN-BEACH] STATE-PARK NEW-YORK BEACH EROSION CONTROL STUDY	5504GR0006
HAMMONASSET	NA - AREA 4 - CONNECTICUT RIVER TO [HAMMONASSET] RIVER CONNECTICUT BEACH EROSION CONTROL STUDY	5206GR0001
	NA - AREA 2 - [HAMMONASSET] RIVER TO EAST RIVER CONNECTICUT BEACH EROSION CONTROL STUDY	5002GR0001
HAMPTON-BEACH	NA - [HAMPTON-BEACH] NEW-HAMPSHIRE BEACH EROSION CONTROL STUDY	5402GR0002
HANAPEPE-BAY	NA - [HANAPEPE-BAY] ISLAND OF KAUAI I. A. BEACH EROSION CONTROL STUDY	5606GR0001
HARBOR	SOME ASPECTS OF SHORE PROTECTION IN BOSTON [HARBOR]	5210GR0004
	NA - ANAHEIM-BAY [HARBOR] CALIFORNIA	5403GR0001
	NA - AREA 9 EAST RIVER TO NEW-HAVEN [HARBOR] CONNECTICUT BEACH EROSION CONTROL STUDY	5605GR0002
	NA - MODEL TESTS WITH MOVEABLE FLOOR IN SEA AND SEA [HARBOR] CONSTRUCTION	5400GR0002
	NA - MODEL INVESTIGATIONS OF [HARBOR] INLET SILTING	5900GR0001
	NA - HELGOLAND HISTORY OF ITS ORIGIN AND MAINTENANCE OF ITS [HARBOR] RELATIVE TO NAVIGATION	5500GR0009
	NA - AREA 3 - NEW-HAVEN [HARBOR] TO HOUSATONIC RIVER CONNECTICUT BEACH EROSION CONTROL STUDY	5306GR0002
	NA - COLD-SPRING INLET (CAPE-MAY [HARBOR]) NEW-JERSEY	5307GR0001
HARBORS	LITTORAL DRIFT PROBLEM AT SHORE-LINE [HARBORS]	5900GR0003
	NA - SUITABILITY OF MODEL TESTS IN MARITIME ENGINEERING IN [HARBORS] SEAWAYS AND COASTAL PROTECTION	5600GR0006
HARKYSTER	NA - MATERIALVANDRING PA [HARKYSTER]	5306GR0005
HARRISON	NA - [HARRISON] COUNTY MISSISSIPPI BEACH EROSION CONTROL STUDY	4805GR0001
HAWAII	NA - HALEIWA-BEACH OAHU [HAWAII] BEACH EROSION CONTROL STUDY	6503GR0004
	NA - WAIKIKI-BEACH OAHU [HAWAII] BEACH EROSION CONTROL STUDY	6503GR0003
HAWKS-NEST-BEACH	[HAWKS-NEST-BEACH] CONNECTICUT	4001GR0003
HEADLANDS	USE OF LONG GROINS AS ARTIFICIAL [HEADLANDS]	6510GR0002
	THE RELATION OF THE ACTION OF WAVES AND CURRENTS ON [HEADLANDS] TO THE CONTROL OF SHORE EROSION BY GROINS	4300GR0001
HELGOLAND	NA - [HELGOLAND] HISTORY OF ITS ORIGIN AND MAINTENANCE OF ITS HARBOR RELATIVE TO NAVIGATION	5500GR0009
HIDDENSEE	NA - COASTAL CHANGES AND COASTAL PROTECTION OF THE ISLAND [HIDDENSEE]	5600GR0007
HISTORY	NA - HELGOLAND [HISTORY] OF ITS ORIGIN AND MAINTENANCE OF ITS HARBOR RELATIVE TO NAVIGATION	5500GR0009
	A PICTORIAL [HISTORY] OF SELECTED STRUCTURES ALONG THE NEW-JERSEY COAST	6410GR0001
	CASE [HISTORY] OF SHORE PROTECTION AT PRESQUE-ISLE PENNSYLVANIA	5210GR0003
	THE [HISTORY] OF THE DUTCH COAST IN THE LAST CENTURY	7009GR0001

HOLLAND	COAST PROTECTION ON THE NORTH-SEA COASTS OF [HOLLAND] FRANCE BELGIUM AND GERMANY	3703GR0001
	NA - REPORT ON THE USE OF ASPHALT AT GROIN CONSTRUCTION IN DELFTLAND (HOLLAND)	4600GR0001
HOLLYWOOD-BEACH	NA - BEACH EROSION AT [HOLLYWOOD-BEACH] FLORIDA	3705GR0001
	REPORT ON BEACH EROSION AT [HOLLYWOOD-BEACH] FLORIDA	3801GR0001
HOWER	STUDY OF EROSION ALONG [HOWER] SPIT AND VICINITY KACHEMAK-BAY ALASKA	6511GR0001
HORIZONTAL	THE BUDD (HORIZONTALLY) PERMEABLE GROIN SYSTEM FOR BEACH EROSION CONTROL AND REBUILDING SAND BEACHES	0000GR0006
HOUSATONIC	NA - AREA 3 - NEW-HAVEN HARBOR TO [HOUSATONIC] RIVER CONNECTICUT BEACH EROSION CONTROL STUDY	5306GR0002
	NA - AREA 7 - [HOUSATONIC] RIVER TO ASH CREEK CONNECTICUT BEACH EROSION CONTROL STUDY	5310GR0004
HUWBOLOTT-BAY	NA - APPENDIX VI [HUWBOLOTT-BAY] (BUHLE POINT) CALIFORNIA BEACH EROSION CONTROL STUDY	5709GR0001
HUNTING-ISLAND-SEA	NA - [HUNTING-ISLAND-SEA] SOUTH-CAROLINA	6407GR0001
HURON	NA - BEACH EROSION STUDY LAKE-ERIE SHORE LINE IN THE VICINITY OF [HURON] OHIO	4505GR0001
HURRICANES	PHOTOGRAPHS OF FORT-MACON NEAR MOREHEAD-CITY NORTH-CAROLINA AFTER SERIES OF [HURRICANES] IN 1954	5400GR0001
HYDRAULIC	EXPERIMENTAL STUDY OF THE [HYDRAULIC] BEHAVIOR OF GROINE SYSTEMS	6809GR0003
	EXPERIMENTAL STUDY OF THE [HYDRAULIC] BEHAVIOR OF INCLINED GROINE SYSTEMS	7009GR0003
	APPLICATION OF ASPHALT IN [HYDRAULIC] ENGINEERING WORKS	5101GR0001
	A STUDY OF GROINS AND THEIR FUNCTION AS [HYDRAULIC] STRUCTURES	6107GR0001
	NA - [HYDRAULIC] STRUCTURES (GROINS DAMS DYKES AND CANAL EMBANKMENTS) OF BITUMEN TYPE	5300GR0004
IDEAS	NA - SOME [IDEAS] ON THE PROBLEM OF RESEARCH IN COASTAL DYNAMICS AND MODEL TESTS OF COASTAL PROTECTION	5600GR0001
ILLINOIS	NA - CITY OF EVANSTON [ILLINOIS] BEACH EROSION CONTROL STUDY	6505GR0003
	PERMEABLE GROINS FROM [ILLINOIS] ON LAKE-MICHIGAN	6500GR0002
	NA - [ILLINOIS] SHORE OF LAKE-MICHIGAN BEACH EROSION CONTROL STUDY	5210GR0006
IMAZU-SAKANU-BEACH	BEACH EROSION AND PROTECTION WORKS IN [IMAZU-SAKANU-BEACH]	6112GR0002
IMPERIAL-BEACH	NA - OCEANSIDE OCEAN-BEACH [IMPERIAL-BEACH] AND CORONADO SAN-DIEGO COUNTY CALIFORNIA BEACH EROSION CONTROL STUDY	5605GR0001
IMPERMEABLE	(IMPERMEABLE) AND PERMEABLE GROINS	5700GR0001
IMPORTANCE	SUMMARY STATEMENT CONCERNING [IMPORTANCE] OF A GROIN DESIGN CRITERION	5810GR0002
IMPROVEMENT	CONEY ISLAND PUBLIC BEACH AND BOARDWALK [IMPROVEMENT]	2300GR0001
	THE PROTECTION AND [IMPROVEMENT] OF FURSHURES BY THE UTILIZATION OF TIDAL AND WAVE ACTION	0306GR0001
INCLINED	EXPERIMENTAL STUDY OF THE HYDRAULIC BEHAVIOR OF [INCLINED] GROINE SYSTEMS	7009GR0003
INCREASING	THE PRINCIPLE OF [INCREASING] PERMEABILITY IN GROIN CONSTRUCTION	0000GR0008
INFLUENCE	THE COASTAL DYNAMICS OF SAND WAVES AND THE [INFLUENCE] OF BREAKWATERS AND GROYNES	0000GR0002
	[INFLUENCE] OF GROINS ON BEACH STABILIZATION	5101GR0002
	[INFLUENCE] OF PROTECTIVE WORKS ON THE EROSION OF THE WEST COAST OF SVLT NORTH-SEA COAST OF GERMANY	0000GR0003
INFORMATION	[INFORMATION] ON BEACH PROTECTION IN FLORIDA	5210GR0008

INITIAL
LABORATORY STUDY OF THE EFFECT OF GROINS ON THE RATE OF LITTORAL TRANSPORT EQUIPMENT DEVELOPMENT AND (INITIAL)
TESTS

INLET

NA - PALM-BEACH COUNTY FLORIDA FROM MARTIN COUNTY LINE TO LAKE-WORTH (INLET) AND FROM SOUTH-LAKE-WORTH INLET TO BROWARD COUNTY LINE BEACH EROSION CONTROL STUDY
NA - ATLANTIC COAST OF NEW-YORK-CITY FROM EAST ROCKAWAY INLET TO ROCKAWAY (INLET) AND JAMAICA-BAY NEW-YORK
NA - ATLANTIC COAST OF LONG-ISLAND FIRE-ISLAND (INLET) AND SHORE WESTERLY TO JONES INLET NEW-YORK
NA - SHORE OF NEW-JERSEY FROM SANDY-HOOK TO BARNEGAT (INLET) BEACH EROSION CONTROL STUDY
NA - SHORE OF NEW-JERSEY FROM SANDY-HOOK TO BARNEGAT (INLET) BEACH EROSION CONTROL STUDY
EARLY ATTEMPTS AT (INLET) CONSTRUCTION ON THE FLORIDA EAST COAST
NA - BEACH EROSION STUDY OF BAKER-SHAUOVER INLET FLORIDA
NA - PALM-BEACH COUNTY FROM LAKE-WORTH INLET TO SOUTH-LAKE-WORTH (INLET) FLORIDA BEACH EROSION CONTROL STUDY
NA - FIRE-ISLAND INLET TO JONES (INLET) LONG-ISLAND NEW-YORK COOPERATIVE BEACH EROSION CONTROL STUDY
REPORT ON EROSION AT MANASQUAN (INLET) NEW-JERSEY AND ADJACENT BEACHES
NA - BEACH EROSION AT MANASQUAN (INLET) NEW-JERSEY AND ADJACENT BEACHES
NA - ATLANTIC COAST OF LONG-ISLAND FIRE-ISLAND INLET AND SHORE WESTERLY TO JONES (INLET) NEW-YORK
NA - MODEL INVESTIGATIONS OF HARBOR (INLET) SILTING
NA - PALM-BEACH COUNTY FLORIDA FROM MARTIN COUNTY LINE TO LAKE-WORTH INLET AND FROM SOUTH-LAKE-WORTH (INLET) TO BROWARD COUNTY LINE BEACH EROSION CONTROL STUDY
NA - SHORE OF NEW-JERSEY - BARNEGAT (INLET) TO CAPE-MAY-CANAL BEACH EROSION CONTROL STUDY
NA - FIRE-ISLAND (INLET) TO JONES INLET LONG-ISLAND NEW-YORK COOPERATIVE BEACH EROSION CONTROL STUDY
NA - ATLANTIC COAST OF NEW-YORK-CITY FROM EAST ROCKAWAY (INLET) TO ROCKAWAY INLET AND JAMAICA-BAY NEW-YORK
NA - PALM-BEACH COUNTY FROM LAKE-WORTH (INLET) TO SOUTH-LAKE-WORTH INLET FLORIDA BEACH EROSION CONTROL STUDY
NA - COLD-SPRING (INLET) (CAPE-MAY HARBOR) NEW-JERSEY

INSEL

DIE SCHUTZHAUTEN AUF DER (INSEL) BORKUM
NA - GUTACHTLICHE STELLUNGNAME ZU DEN UNTERSUCHUNGEN UBER DIE URSACHEN DER ABRUCHSERSCHENUNGEN AM WEST UND NORD-WESTSTRAND DER (INSEL) NORDERNEY
NA - DIE URSACHEN DER ABRUCHSERSCHENUNGEN AN WEST UND NORDWESTSTRAND DER (INSEL) NORDERNEY

INSTALLATION

PHOTOGRAPHS OF SARASOTA COUNTY FLORIDA SHOWING GROIN (INSTALLATION)
NA - THEORETICAL OBSERVATIONS FOR (INSTALLATION) OF COASTAL PROTECTIVE STRUCTURES ON TIDELESS SHORES
TEST WITH SCALE MODELS TO DETERMINE THE EFFECT OF CURRENTS AND BREAKERS UPON A SANDY BEACH AND THE ADVANTAGEOUS (INSTALLATION) OF GROINSTON OF GROINS

INTERIM

(INTERIM) REPORT ON ASPHALT GROINS AT OCEAN-CITY MARYLAND
NA - COAST OF SOUTHERN CALIFORNIA - SPECIAL (INTERIM) REPORT ON THE VENTURA AREA COOPERATIVE BEACH EROSION CONTROL STUDY

INTERNAL

NA - ON THE LENGTH AND THE (INTERNAL) STRUCTURE OF SEASHORE GROINS

INTERNATIONAL

REPORT TO THE 22ND (INTERNATIONAL) NAVIGATION CONGRESS
REPORT TO THE 22ND (INTERNATIONAL) NAVIGATION CONGRESS
NA - REPORT TO THE 22ND (INTERNATIONAL) NAVIGATION CONGRESS
REPORT TO THE 21ST (INTERNATIONAL) NAVIGATION CONGRESS
REPORT TO THE 18TH (INTERNATIONAL) NAVIGATION CONGRESS
NA - REPORT TO THE 17TH (INTERNATIONAL) NAVIGATION CONGRESS
NA - REPORT TO THE 17TH (INTERNATIONAL) NAVIGATION CONGRESS
REPORT TO THE 17TH (INTERNATIONAL) NAVIGATION CONGRESS
REPORT TO THE 17TH (INTERNATIONAL) NAVIGATION CONGRESS
REPORT TO THE 17TH (INTERNATIONAL) NAVIGATION CONGRESS
REPORT TO THE 15TH (INTERNATIONAL) NAVIGATION CONGRESS
REPORT TO THE 15TH (INTERNATIONAL) NAVIGATION CONGRESS
REPORT TO THE 17TH (INTERNATIONAL) NAVIGATION CONGRESS

5906GR0001

6105GR0002

6506GR0001

6503GR0002

5802GR0002

5603GR0001

3807GR0001

4604GR0002

5712GR0004

5605GR0003

3801GR0002

3701GR0001

6503GR0002

5900GR0001

6105GR0002

5908GR0001

5605GR0003

6506GR0001

5712GR0004

5307GR0001

INVESTIGATION	NA - AN [INVESTIGATION] INTO THE EFFECTIVENESS OF VARIOUS TYPES OF GROYNES ON SEAFORD-BEACH	6300GR0001
INVESTIGATIONS	SEA GROINS EFFECTIVENESS [INVESTIGATIONS] BY DYED SAND TESTS	6600GR0001
	NA - MODEL [INVESTIGATIONS] OF HARBOR INLET SILTING	5900GR0001
	[INVESTIGATIONS] OF STEEL SHEET PILING	3607GR0002
IN-SITU		
MODEL STUDIES [IN-SITU] OBSERVATIONS		7000GR0003
ISLAND		
	NA - PROBLEMS OF [ISLAND] AND COAST PROTECTION	4500GR0001
	NA - DELAWARE COAST FROM KITT'S-HUMMOCK TO FENWICK [ISLAND] BEACH EROSION CONTROL STUDY	5707GR0001
	NA - PROTECTION OF THE WEST BEACH OF SYLT [ISLAND] BY FLAT GROINS	6000GR0002
	NA - AMELIA [ISLAND] FLORIDA BEACH EROSION CONTROL STUDY	6106GR0002
	NA - JUPITER [ISLAND] FLORIDA BEACH EROSION CONTROL STUDY	4812GR0007
	NA - STATEN [ISLAND] FORT-WADSWORTH TO ARTHUR-KILL NEW-YORK BEACH EROSION CONTROL STUDY	6505GR0001
	NA - BEACH EROSION STUDY ST-SIMON [ISLAND] GEORGIA	4010GR0002
	NA - COASTAL CHANGES AND COASTAL PROTECTION OF THE [ISLAND] HUIDENSEE	5600GR0007
	AERIAL PHOTOGRAPHS PLUM [ISLAND] MASSACHUSETTS	6208GR0001
	NA - PLUM [ISLAND] MASSACHUSETTS BEACH EROSION CONTROL STUDY	5308GR0002
	NA - OCRACOE [ISLAND] NORTH-CAROLINA	6503GR0001
	NA - CONSTRUCTION OF A HEAVY DUNE COVER BY ASPHALT HASALT METHOD ON THE [ISLAND] OF BOHKUM	5700GR0005
	NA - WAIMEA-BEACH AND HANAPEPE-BAY [ISLAND] OF KAUAI T. H. BEACH EROSION CONTROL STUDY	5606GR0001
	BEACH REHABILITATION BY USE OF BEACH FILLS AND FURTHER PLANS FOR THE PROTECTION OF THE [ISLAND] OF NORDERNEY	6008GR0005
	NA - WAIKIKI-BEACH [ISLAND] OF OAHU T. H. BEACH EROSION CONTROL STUDY	5308GR0001
	NA - [ISLAND] PROTECTION ON EAST FRIESTIAN COAST	5600GR0003
	NA - THE EFFECT OF [ISLAND] PROTECTIVE STRUCTURES ON BEACH DEVELOPMENT IN WEST PART OF NORDERNEY	5500GR0008
	NA - ORIGIN AND DEVELOPMENT OF [ISLAND] PROTECTIVE WORKS ON NORDERNEY	5500GR0006
	CONEY [ISLAND] PUBLIC BEACH AND BUACHWALK IMPROVEMENT	2300GR0001
	GALVESTON [ISLAND] SHORELINE AND THE PROTECTION OF GALVESTON-BEACH	3807GR0002
	REPORT ON ST-SIMON [ISLAND] STUDIES	4101GR0001
	NA - GULF SHORE OF GALVESTON [ISLAND] TEXAS BEACH EROSION CONTROL STUDY	5307GR0002
	NA - ORIGIN AND DECLINE OF THE [ISLAND] THIESCHEN	5000GR0002
ISLANDS		
	NA - PROVISIONS FOR STABILIZATION AND MAINTENANCE OF FLOATING [ISLANDS] OF THE SOUTH COAST OF GERMAN NORTH-SEA	5700GR0004
ISLE	A MATHEMATICAL THEORY ABOUT SAND WAVES AND ITS APPLICATION ON THE DUTCH WADDEN [ISLE] OF VLIELAND	6810GR0001
ISRAEL		
NEW COASTAL WORKS AT NAHARIYA ([ISRAEL])		6502GR0001
JACOB-RIIS	(JACOB-RIIS) PARK	
	NA - BEACH EROSION AT [JACOB-RIIS] PARK LONG-ISLAND NEW-YORK	3604GR0002
JAMAICA-BAY		3601GR0002
	NA - ATLANTIC COAST OF NEW-YORK-CITY FROM EAST ROCKAWAY INLET TO ROCKAWAY INLET AND [JAMAICA-BAY] NEW-YORK	6506GR0001
JETTIES		
	MEASURES AGAINST EROSION AT GROINS AND [JETTIES]	5210GR0001
	ASPHALT GROINS AND [JETTIES]	5511GR0002
	MESH [JETTIES]	3602GR0001
	PERMEABLE [JETTIES] BUILT TO PROTECT CLEVELANDS SHORE	4507GR0001
	PIERS AND [JETTIES] OF PRECAST CONCRETE	4602GR0002
	CURVED [JETTIES] SEA-WALLS BULKHEADS AND RETAINING WALLS	4001GR0002
JETTY		
	BETTER [JETTY] FOR LESS MONEY	5903GR0001
JONES		
	NA - FIRE-ISLAND INLET TO [JONES] INLET LONG-ISLAND NEW-YORK COOPERATIVE BEACH EROSION CONTROL STUDY	5605GR0003
	NA - ATLANTIC COAST OF LONG-ISLAND FIRE-ISLAND INLET AND SHORE WESTERLY TO [JONES] INLET NEW-YORK	6503GR0002
JUPITER		
	NA - [JUPITER] ISLAND FLORIDA BEACH EROSION STUDY	4812GR0007

KACHEMAK-BAY	6511GR0001
STUDY OF EROSION ALONG HUNTER SPIT AND VICINITY [KACHEMAK-BAY] ALASKA	
KAUAI	5606GR0001
NA - WAIMEA-BEACH AND HANAPEPE-BAY ISLAND OF [KAUAI] I. H. BEACH EROSION CONTROL STUDY	
KENOSHA	4001GR0001
PERMEABLE GROINS AT [KENOSHA] WISCONSIN	
NA - CITY OF [KENOSHA] WISCONSIN BEACH EROSION CONTROL STUDY	5509GR0002
KEYS	6209GR0004
NA - BEACH EROSION CONTROL REPORT ON COOPERATIVE STUDY OF VIRGINIA AND BISCAYNE [KEYS] FLORIDA	
NA - ANNA-MARIA AND LONGBOAT [KEYS] FLORIDA BEACH EROSION STUDY	4812GR0004
KITTS-HUMMOCK	5707GR0001
NA - DELAWARE COAST FROM [KITTS-HUMMOCK] TO FENWICK ISLAND BEACH EROSION CONTROL STUDY	
KUSTENAUSSCHUSSES	5600GR0004
NA - AUS DEN ARBEITEN DES [KUSTENAUSSCHUSSES] OST	
KUSTENFORSCHUNGEN	5700GR0009
NA - [KUSTENFORSCHUNGEN] IM KAUM FEHMARN NORDWAGRIEN	
KUSTENSCHUTZ	5500GR0002
NA - ALLGEMEINE EMPFEHLUNGEN FÜR DEN DEUTSCHEN [KUSTENSCHUTZ]	
NA - HUNDERT JAHRE [KUSTENSCHUTZ] AN DER NORDSEE	5500GR0003
NA - UFERVERÄNDERUNGEN UND [KUSTENSCHUTZ] AUF SYLT	5700GR0006
KUSTENSCHUTZPROBLE	
NA - FOLGERUNGEN AUS UNTERSUCHUNGEN ÜBER [KUSTENSCHUTZPROBLEME] AUF SYLT	
LABORATORY	5700GR0007
[LABORATORY] STUDY OF THE EFFECT OF GROINS ON THE RATE OF LITTORAL TRANSPORT EQUIPMENT DEVELOPMENT AND INITIAL TESTS	
LAKE	5906GR0001
NA - APPENDIX IX - SHORE OF LAKE-ERIE IN [LAKE] COUNTY OHIO BEACH EROSION CONTROL STUDY	
SHOREWOOD PROTECTS ITS [LAKE] FRONT	5005GR0001
LAKE#000	3807GR0004
NA - CLEVELAND AND [LAKEWOOD] OHIO BEACH EROSION CONTROL STUDY	
LAKE-ERIE	5003GR0002
PERMEABLE AND SEMIPERMEABLE GROINS FROM OHIO ON [LAKE-ERIE]	
EFFECTS OF LARGE STRUCTURES ON THE OHIO SHORE OF [LAKE-ERIE]	6500GR0003
EROSION PROBLEMS ON THE OHIO SHORE OF [LAKE-ERIE]	6400GR0002
NA - APPENDICES V AND X OHIO SHORE LINE OF [LAKE-ERIE] BETWEEN ASHTABULA AND THE PENNSYLVANIA STATE LINE BEACH EROSION CONTROL STUDY	5204GR0001
NA - APPENDICES III VII AND XII OHIO SHORE LINE OF [LAKE-ERIE] BETWEEN FAIRPORT AND ASHTABULA BEACH EROSION CONTROL STUDY	5201GR0003
NA - APPENDIX VIII OHIO SHORE LINE OF [LAKE-ERIE] BETWEEN VERMILLION AND SHEFFIELD-LAKE-VILLAGE BEACH EROSION CONTROL STUDY	5201GR0002
NA - APPENDIX XI OHIO SHORE LINE OF [LAKE-ERIE] EUCLID TO CHAGRIN RIVER BEACH EROSION CONTROL STUDY	5308GR0003
NA - BEACH EROSION STUDY OHIO SHORE LINE OF [LAKE-ERIE] FROM OHIO - MICHIGAN STATE LINE TO MARBLEHEAD OHIO	5402GR0001
NA - APPENDIX IX - SHORE OF [LAKE-ERIE] IN LAKE COUNTY OHIO BEACH EROSION CONTROL STUDY	4505GR0002
NA - APPENDIX IV OHIO SHORE LINE OF [LAKE-ERIE] SANDUSKY MAY OHIO BEACH EROSION CONTROL STUDY	5005GR0001
NA - APPENDIX IV OHIO SHORE LINE OF [LAKE-ERIE] SANDUSKY TO VERMILLION OHIO BEACH EROSION CONTROL STUDY	5304GR0002
NA - APPENDIX XIV OHIO SHORE LINE OF [LAKE-ERIE] SHEFFIELD-LAKE-VILLAGE TO ROCKY RIVER BEACH EROSION CONTROL STUDY	5212GR0002
NA - [LAKE-ERIE] SHORE LINE FROM THE MICHIGAN - OHIO STATE LINE TO MARBLEHEAD OHIO BEACH EROSION CONTROL STUDY	5304GR0003
NA - BEACH EROSION STUDY [LAKE-ERIE] SHORE LINE IN THE VICINITY OF HURON OHIO	6101GR0002
LAKE-MICHIGAN	4505GR0001
PERMEABLE GROINS FROM ILLINOIS ON [LAKE-MICHIGAN]	
GROINS FROM WISCONSIN ON [LAKE-MICHIGAN]	6500GR0002
EFFECTIVENESS OF PERMEABLE TYPE GROINS USED FOR BEACH PROTECTION AT SHOREWOOD WISCONSIN AND OTHER CITIES ALONG THE WEST SHORE OF [LAKE-MICHIGAN]	6500GR0001
THE NORTH SHORE VERSUS [LAKE-MICHIGAN]	3911GR0001
NA - ILLINOIS SHORE OF [LAKE-MICHIGAN] BEACH EROSION CONTROL STUDY	3011GR0001
[LAKE-MICHIGAN] EROSION STUDIES	5210GR0006
	5300GR0001

LAKE-MICHIGAN (CONTINUED)	4604GR0001
NA - BEACH EROSION STUDY (LAKE-MICHIGAN) SHORE LINE OF MILWAUKEE COUNTY WISCONSIN	
LAKE-WORTH	6105GR0002
NA - PALM-BEACH COUNTY FLORIDA FROM MARTIN COUNTY LINE TO (LAKE-WORTH) INLET AND FROM SOUTH-LAKE-WORTH INLET TO GROWARD COUNTY LINE BEACH EROSION CONTROL STUDY	5712GR0004
NA - PALM-BEACH COUNTY FROM (LAKE-WORTH) INLET TO SOUTH-LAKE-WORTH INLET FLORIDA BEACH EROSION CONTROL STUDY	6400GR0002
LARGE EFFECTS OF (LARGE) STRUCTURES ON THE OHIO SHORE OF LAKE-ERIE	6809GR0004
LARVOTTO-BAY	0000GR0004
THE CREATION OF AN ARTIFICIAL BEACH IN (LARVOTTO-BAY) MONTE-CARLO PRINCIPALITY OF MONACO	0000GR0007
LEE-EROSION	6410GR0002
NA - MODEL TESTS OF BEACH BREAK AT THE END OF STABILIZED COASTAL BEACHES (LEE-EROSION)	5903GR0001
LENGTH	6510GR0003
NA - ON THE (LENGTH) AND THE INTERNAL STRUCTURE OF SEASHORE GROINS	5210GR0002
LEROSION	4806GR0001
NA - PROTECTION DES COTES CONTRE (LEROSION) MARITIME ET FORMATION DES PLAGES DE SABLE	5700GR0013
LESS BETTER JETTY FOR (LESS) MONEY	5900GR0003
LIABILITIES	5008GR0001
GROINS AND EFFECTS - MINIMIZING (LIABILITIES)	6510GR0004
LIFE (LIFE) OF STEEL SHEET PILE STRUCTURES IN ATLANTIC COASTAL STATES	5010GR0002
LIMIT PAPER ON PROTECTIVE WORKS ADAPTED TO (LIMIT) EROSION ALONG THE OPEN COAST HOW THEY WORK	5906GR0001
LIMITS	5409GR0004
NA - POSSIBILITIES AND (LIMITS) FOR APPLICATION OF ASPHALT TYPES OF CONSTRUCTIONS FOR COASTAL PROTECTION	6510GR0002
LITTORAL	4812GR0004
(LITTORAL) DRIFT PROBLEM AT SHORE-LINE HARBOURS	5511GR0003
THE DANISH WESTCOAST - (LITTORAL) DRIFT PROBLEMS AND MEASURES AGAINST COAST EROSION	5200GR0001
(LITTORAL) PROCESSES AND THE DEVELOPMENT OF SHORELINES	6809GR0007
(LITTORAL) PROCESSES ON SANDY COASTS	6503GR0002
SCALE EFFECTS IN MODELS WITH (LITTORAL) SAND DRIFT	3812GR0001
LABORATORY STUDY OF THE EFFECT OF GROINS ON THE RATE OF (LITTORAL) TRANSPORT EQUIPMENT DEVELOPMENT AND INITIAL TESTS	3601GR0002
LOIRE	5605GR0003
LES OUVRAGES DE DEFENCE CONTRE LA MER SUR LA COTE FRANCAISE DE LOCEAN ENTRE LA (LOIRE) ET LA GIRONDE	7011GR0001
LONG	3012GR0001
USE OF (LONG) GROINS AS ARTIFICIAL HEADLANDS	5604GR0001
LONGBOAT	6202GR0001
NA - ANNA-MARIA AND (LONGBOAT) KEYS FLORIDA BEACH EROSION STUDY	5504GR0004
LONGITUDINAL	
THE (LONGITUDINAL) STABILITY OF BEACHES	
NA - UNDERWATER (LONGITUDINAL) WORKS FOR COASTAL PROTECTION	
LONG-ISLAND	
THE ATLANTIC COAST OF (LONG-ISLAND)	
COAST EROSION AND PROTECTION ON (LONG-ISLAND) AND NEW-JERSEY	
NA - ATLANTIC COAST OF (LONG-ISLAND) FIRE-ISLAND INLET AND SHORE WESTERLY TO JONES INLET NEW-YORK	
EFFECTIVENESS OF GROINS AT ROCKAWAY-BEACH (LONG-ISLAND) NEW-YORK	
NA - BEACH EROSION AT JACOB-RIS PARK (LONG-ISLAND) NEW-YORK	
NA - FIRE-ISLAND INLET TO JONES INLET (LONG-ISLAND) NEW-YORK COOPERATIVE BEACH EROSION CONTROL STUDY	
BEACH BEHAVIOR NORTH SHORE (LONG-ISLAND) SOUND	
LOS-ANGELES	
REPORT OF ADVISORY-BOARD ON BEACH PROTECTION (LOS-ANGELES) COUNTY	
LOUISIANA	
BEACH EROSION CONTROL GRAND-ISLE (LOUISIANA)	
NA - BELLE-PASS TO RACCOON POINT (LOUISIANA) BEACH EROSION CONTROL STUDY	
NA - GRAND-ISLE (LOUISIANA) BEACH EROSION CONTROL STUDY	

LOW-COST
CONCRETE BLOCKS FORM (LOW-COST) GROINS
LUMINESCENT
COLORED SAND TESTS WITH (LUMINESCENT) SAND IN GROIN FIELDS
MAINTENANCE
NA - PROVISIONS FOR STABILIZATION AND (MAINTENANCE) OF FLOATING ISLANDS OF THE SOUTH COAST OF GERMAN NORTH-SEA
NA - HELGOLAND HISTORY OF ITS ORIGIN AND (MAINTENANCE) OF ITS HARBOR RELATIVE TO NAVIGATION
CONSTRUCTION AND (MAINTENANCE) OF THE PUBLIC BEACH AT HOCKMAY-BEACH BOROUGH OF QUEENS
MANASQUAN
NA - BEACH EROSION AT (MANASQUAN) INLET NEW-JERSEY AND ADJACENT BEACHES
REPORT ON EROSION AT (MANASQUAN) INLET NEW-JERSEY AND ADJACENT BEACHES
MANITOWOC
NA - (MANITOWOC) COUNTY FROM TWO-RIVERS TO MANITOWOC WISCONSIN BEACH EROSION CONTROL STUDY
NA - MANITOWOC COUNTY FROM TWO-RIVERS TO (MANITOWOC) WISCONSIN BEACH EROSION CONTROL STUDY
MANUAL
NA - (MANUAL) OF WATER ECONOMY
MARBLEHEAD
NA - BEACH EROSION STUDY OHIO SHORE LINE OF LAKE-ERIE FROM OHIO - MICHIGAN STATE LINE TO (MARBLEHEAD) OHIO
NA - LAKE-ERIE SHORE LINE FROM THE MICHIGAN - OHIO STATE LINE TO (MARBLEHEAD) OHIO BEACH EROSION CONTROL STUDY
MARITIMA
NA - PROTECCAO DA COSTA CONTRA A EROSAO (MARITIMA) E FORMACAO DE PRAIAS DE ARCIA - DOIS PROBLEMAS NA COSTA DE
MOCAMBIQUE
MARITIME
(MARITIME) AND RIPARIAN USE OF GRABIONS
NA - SUITABILITY OF MODEL TESTS IN (MARITIME) ENGINEERING IN HARBORS SEAWAYS AND COASTAL PROTECTION
NA - PROTECTION DES COTES CONTRE LE ROSION (MARITIME) ET FORMATION DES PLAGES DE SABLE
WINDS WAVES AND (MARITIME) STRUCTURES
MARTIN
NA - PALM-BEACH COUNTY FLORIDA FROM (MARTIN) COUNTY LINE TO LAKE-WORTH INLET AND FROM SOUTH-LAKE-WORTH INLET TO
BROWARD COUNTY LINE BEACH EROSION CONTROL STUDY
MARYLAND
BEHAVIOR OF SAND ASPHALT GROINS AT OCEAN-CITY (MARYLAND)
INTERIM REPORT ON ASPHALT GROINS AT OCEAN-CITY (MARYLAND)
THE ASPHALT GROINS AT OCEAN-CITY (MARYLAND)
REPORT ON SHORE EROSION AT TILGHMAN POINT (MARYLAND)
MARYLANDS
(MARYLANDS) FAVORITE BEACH AT OCEAN-CITY
MASSACHUSETTS
NA - FALMOUTH (MASSACHUSETTS)
AERIAL PHOTOGRAPHS PLUM ISLAND (MASSACHUSETTS)
NA - WESSAGUSSETT-BEACH WEYMOUTH (MASSACHUSETTS)
COASTAL PROTECTION IN (MASSACHUSETTS)
SHORE PROTECTIVE WORK AT WINTHROP (MASSACHUSETTS)
SHORE PROTECTIVE WORK AT WINTHROP (MASSACHUSETTS)
NA - SHORE BETWEEN PEMBERTON POINT AND CAPE-COD (MASSACHUSETTS) BEACH EROSION CONTROL STUDY
NA - CLARK POINT NEW-BEDFORD (MASSACHUSETTS) BEACH EROSION CONTROL STUDY
NA - PLUM ISLAND (MASSACHUSETTS) BEACH EROSION CONTROL STUDY
NA - QUINCY-SHORE-BEACH (MASSACHUSETTS) BEACH EROSION CONTROL STUDY
NA - REVERE-BEACH (MASSACHUSETTS) BEACH EROSION CONTROL STUDY
NA - REVERE-BEACH (MASSACHUSETTS) BEACH EROSION CONTROL STUDY
NA - CHATHAM (MASSACHUSETTS) BEACH EROSION CONTROL STUDY
NA - WINTHROP-BEACH (MASSACHUSETTS) BEACH EROSION CONTROL STUDY
MATERIAL
NA - GROYNES AS BARRIERS TO MOVEMENT OF BEACH (MATERIAL)
OBSERVATIONS ON THE TRAVEL OF SHORE (MATERIAL) ALONG A CHALK FORESHORE
MATERIALS
PROTECTION OF COASTS AGAINST THE SEA WITH OR WITHOUT PREPONDERATING COASTAL DRIFT OF (MATERIALS)

MATERIALS (CONTINUED)
 SHORE PROTECTION METHODS AND [MATERIALS]
 MATERIALVANDRING
 NA - [MATERIALVANDRING] PA HARKYSTER 4410GR0002
 5306GR0005
 MATHEMATICAL
 A [MATHEMATICAL] THEORY ABOUT SAND WAVES AND ITS APPLICATION ON THE DUTCH WADDEN ISLE OF VLIELAND 6810GR0001
 MAURICE
 NA - NEW-JERSEY COAST OF DELAWARE-BAY FROM CAPE-MAY-CANAL TO [MAURICE] RIVER BEACH EROSION CONTROL STUDY 6106GR0001
 MECKLENBURGS
 NA - DIE NORDOOSTLICHE HEIDE [MECKLENBURGS] 5700GR0003
 MESH [MESH] JETTIES 3602GR0001
 METHOD
 A NEW [METHOD] OF CONSTRUCTION IN COAST EROSION CONTROL 3507GR0001
 NA - CONSTRUCTION OF A HEAVY DUNE COVER BY ASPHALT HASALT [METHOD] ON THE ISLAND OF BORKUM 5700GR0005
 METHODS
 SHORE PROTECTION [METHODS] AND MATERIALS
 COASTAL PROTECTION REVIEW OF [METHODS] FOR DEFENCE
 EMERGENCY [METHODS] TO COMBAT BEACH EROSION
 MEXICAN
 PROTECTION WORKS ON THE [MEXICAN] COAST THE CREATION OF BEACHES AND DUNES 4410GR0002
 5311GR0001
 6504GR0001
 MIAMI-BEACH 5701GR0001
 ALL STEEL GROUPE - [MIAMI-BEACH]
 SEA-WALLS AND GROUINS OF STEEL SHEETING STABILIZE [MIAMI-BEACH] 4910GR0002
 3105GR0001
 MICHIGAN
 NA - BERRIEN COUNTY [MICHIGAN] BEACH EROSION CONTROL STUDY 5802GR0002
 NA - BEACH EROSION STUDY OHIO SHORE LINE OF LAKE-ERIE FROM OHIO - [MICHIGAN] STATE LINE TO MARBLEHEAD OHIO 4505GR0002
 NA - LAKE-ERIE SHORE LINE FROM THE [MICHIGAN] - OHIO STATE LINE TO MARBLEHEAD OHIO BEACH EROSION CONTROL STUDY 6101GR0002
 MILWAUKEE
 NA - BEACH EROSION STUDY LAKE-MICHIGAN SHORE LINE OF [MILWAUKEE] COUNTY #1SCUNSI 4604GR0001
 MISSISSIPPI
 RECENT STORM DAMAGE ALONG THE COASTS OF FLORIDA AND [MISSISSIPPI]
 NA - HARRISON COUNTY [MISSISSIPPI] BEACH EROSION CONTROL STUDY 4801GR0001
 4805GR0001
 MOCAMBIQUE
 NA - PROTECCAO DA COSTA CONTRA A EROSÃO MARÍTIMA E FORMACAO DE PRAIAS DE ARCIA - DOIS PROBLEMAS NA COSTA DE [MOCAMBIQUE] 6400GR0004
 MODEL
 NA - [MODEL] INVESTIGATIONS OF HARBOR INLET SILTING 5900GR0001
 [MODEL] STUDIES IN-SITU OBSERVATIONS 7000GR0003
 A [MODEL] STUDY OF THE BEHAVIOR OF BEACHES AND GROUINS 6206GR0001
 NA - SUITABILITY OF [MODEL] TESTS IN MARITIME ENGINEERING IN HARBORS SEAWAYS AND COASTAL PROTECTION 5005GR0006
 NA - [MODEL] TESTS OF BEACH BREAK AT THE END OF STABILIZED COASTAL HEADCHES LEE-EROSION 0005GR0004
 NA - SOME IDEAS ON THE PROBLEM OF RESEARCH IN COASTAL DYNAMICS AND [MODEL] TESTS OF COASTAL PROTECTION 5605GR0001
 NA - [MODEL] TESTS OF WAVE RUN-UP ON SEA DYKES IN WATT REGION 5405GR0004
 NA - [MODEL] TESTS WITH MOVEABLE FLOUR IN SEA AND SEA HARBOR CONSTRUCTION 5400GR0002
 MODELS
 TEST WITH SCALE [MODELS] TO DETERMINE THE EFFECT OF CURRENTS AND BREAKERS UPON A SANDY BEACH AND THE ADVANTAGEOUS INSTALLATION OF GROUINS 2806GR0001
 SCALE EFFECTS IN [MODELS] WITH LITTORAL SAND DRIFT 6008GR0001
 MONACO
 THE CREATION OF AN ARTIFICIAL BEACH IN LARVOTTO-BAY MONTE-CARLO PRINCIPALITY OF [MONACO] 6809GR0004
 MONTECITO
 DETAIL OF CONCRETE BLOCK USED IN GROINS CONSTRUCTED AT [MONTECITO] CALIFORNIA 2902GR0001
 MONTE-CARLO
 THE CREATION OF AN ARTIFICIAL BEACH IN LARVOTTO-BAY [MONTE-CARLO] PRINCIPALITY OF MONACO 6809GR0004
 MOREHEAD-CITY
 PHOTOGRAPHS OF FORT-MACON NEAR [MOREHEAD-CITY] NORTH-CAROLINA AFTER SERIES OF HURRICANES IN 1954 5400GR0001

MOTION	(MOTION) OF SAND PARTICLES BETWEEN GROINS	5812GR0001
MOVEABLE	NA - MODEL TESTS WITH (MOVEABLE) FLOOR IN SEA AND SEA HARBOR CONSTRUCTION	5400GR0002
MOVEMENT	SAND (MOVEMENT) AND BEACH EROSION	3106GR0001
	NA - GROYNES AS BARRIERS TO (MOVEMENT) OF BEACH MATERIAL	6200GR0003
	THE NEARSHORE (MOVEMENT) OF SAND AT DUNBIRN	6207GR0001
MUGU	NA - APPENDIX I COAST OF CALIFORNIA CARPENTERIA TO POINT (MUGU) BEACH EROSION CONTROL STUDY	5210GR0007
	NA - APPENDIX II COAST OF CALIFORNIA POINT (MUGU) TO SAN-PEDRO BREAKWATER BEACH EROSION CONTROL STUDY	5311GR0002
MULLET-KEY	NA - [MULLET-KEY] FLORIDA	6610GR0002
NABARIYA	NEW COASTAL WORKS AT (NABARIYA) (ISRAEL)	6502GR0001
NAVIGATION	NA - HELGOLAND HISTORY OF ITS ORIGIN AND MAINTENANCE OF ITS HARBOR RELATIVE TO (NAVIGATION)	5500GR0009
	NA - REPORT TO THE 22ND INTERNATIONAL (NAVIGATION) CONGRESS	6900GR0003
	REPORT TO THE 21ST INTERNATIONAL (NAVIGATION) CONGRESS	6500GR0004
	REPORT TO THE 22ND INTERNATIONAL (NAVIGATION) CONGRESS	6900GR0004
	REPORT TO THE 22ND INTERNATIONAL (NAVIGATION) CONGRESS	6900GR0001
	REPORT TO THE 14TH INTERNATIONAL (NAVIGATION) CONGRESS	5300GR0003
	REPORT TO THE 15TH INTERNATIONAL (NAVIGATION) CONGRESS	3100GR0001
	REPORT TO THE 15TH INTERNATIONAL (NAVIGATION) CONGRESS	3100GR0002
	REPORT TO THE 17TH INTERNATIONAL (NAVIGATION) CONGRESS	4900GR0001
	NA - REPORT TO THE 17TH INTERNATIONAL (NAVIGATION) CONGRESS	4900GR0002
	REPORT TO THE 17TH INTERNATIONAL (NAVIGATION) CONGRESS	4900GR0005
	NA - REPORT TO THE 17TH INTERNATIONAL (NAVIGATION) CONGRESS	4900GR0006
	REPORT TO THE 17TH INTERNATIONAL (NAVIGATION) CONGRESS	4900GR0003
	REPORT TO THE 17TH INTERNATIONAL (NAVIGATION) CONGRESS	4900GR0004
NEARSHORE	THE (NEARSHORE) MOVEMENT OF SAND AT DUNBIRN	6207GR0001
NEWPORT-BAY	NA - SAN-GABRIEL RIVER TO (NEWPORT-BAY) ORANGE COUNTY CALIFORNIA APPENDIX V PHASE II BEACH EROSION CONTROL STUDY	6210GR0002
NEW-BEDFORD	NA - CLARK POINT (NEW-BEDFORD) MASSACHUSETTIS BEACH EROSION CONTROL STUDY	6209GR0003
NEW-ENGLAND	BEHAVIOR OF BEACH FILLS IN (NEW-ENGLAND)	6102GR0001
	BEHAVIOR OF BEACH FILLS IN (NEW-ENGLAND)	6200GR0002
	BEACH EROSION CONTROL IN (NEW-ENGLAND)	6910GR0001
NEW-HAMPSHIRE	AERIAL PHOTOGRAPHS OF WALLIS-SAND STATE-BEACH RYE (NEW-HAMPSHIRE)	6306GR0001
	NA - SHORE OF THE STATE OF (NEW-HAMPSHIRE) BEACH EROSION CONTROL STUDY	6205GR0003
	NA - HAMPTON-BEACH (NEW-HAMPSHIRE) BEACH EROSION CONTROL STUDY	5402GR0002
NEW-HAVEN	NA - AREA 9 EAST RIVER TO (NEW-HAVEN) HARBOR CONNECTICUT BEACH EROSION CONTROL STUDY	5605GR0002
	NA - AREA 3 - (NEW-HAVEN) HARBOR TO Housatonic RIVER CONNECTICUT BEACH EROSION CONTROL STUDY	5306GR0002
NEW-JERSEY	NA - RAZITAN-BAY AND SANDY-HOOK-BAY (NEW-JERSEY)	6206GR0003
	NA - GOLD-SPRING INLET (CAPE-MAY HARBOR) (NEW-JERSEY)	5307GR0001
	BEHAVIOR OF BEACH FILL AT OCEAN-CITY (NEW-JERSEY)	5602GR0001
	COAST EROSION AND PROTECTION ON LONG-ISLAND AND (NEW-JERSEY)	1506GR0001
	REPORT ON EROSION AT MANASQUAN INLET (NEW-JERSEY) AND ADJACENT BEACHES	3801GR0002
	NA - BEACH EROSION AT MANASQUAN INLET (NEW-JERSEY) AND ADJACENT BEACHES	3701GR0001
	NA - ATLANTIC-CITY (NEW-JERSEY) BEACH EROSION CONTROL STUDY	6407GR0002

NEW-JERSEY	(CONTINUED)	6505GR0002
NA - PERTH-AMHUY [NEW-JERSEY] BEACH EROSION CONTROL STUDY		5306GR0003
NA - OCEAN-CITY [NEW-JERSEY] BEACH EROSION CONTROL STUDY		5003GR0001
NA - ATLANTIC-CITY [NEW-JERSEY] BEACH EROSION CONTROL STUDY		6410GR0001
NA - ATLANTIC HISTORY OF SELECTED STRUCTURES ALONG THE [NEW-JERSEY] COAST		6106GR0001
NA - [NEW-JERSEY] COAST OF DELAWARE-BAY FROM CAPE-MAY-CANAL TO MAURICE RIVER BEACH EROSION CONTROL STUDY		5802GR0002
NA - SHORE OF [NEW-JERSEY] FROM SANDY-HOOK TO BARNEGAT INLET BEACH EROSION CONTROL STUDY		5603GR0001
NA - SHORE OF [NEW-JERSEY] FROM SANDY-HOOK TO BARNEGAT INLET BEACH EROSION CONTROL STUDY		5904GR0001
UNFINISHED BUSINESS [NEW-JERSEY] GROIN PROJECT STALLED BY WINTER DEVELOPMENT OF THE [NEW-JERSEY] SHORE		5210GR0005
NA - SHORE OF [NEW-JERSEY] - BARNEGAT INLET TO CAPE-MAY-CANAL BEACH EROSION CONTROL STUDY		5908GR0001
NEW-YORK		6506GR0001
NA - ATLANTIC COAST OF NEW-YORK-CITY FROM EAST ROCKAWAY INLET TO ROCKAWAY INLET AND JAMAICA-BAY [NEW-YORK]		6207GR0002
THE PROTECTION AND PRESERVATION OF THE ATLANTIC SHORE FRONT OF THE STATE OF [NEW-YORK]		6503GR0002
NA - ATLANTIC COAST OF LONG-ISLAND FIRE-ISLAND INLET AND SHORE WESTERLY TO JONES INLET [NEW-YORK]		3601GR0002
NA - BEACH EROSION AT JACOB-HILLS PARK LONG-ISLAND [NEW-YORK]		3711GR0002
NA - STUDY OF AN ARTIFICIAL BATHING BEACH AT ORCHARD-BEACH PELHAM-BAY [NEW-YORK]		3812GR0001
EFFECTIVENESS OF GROINS AT ROCKAWAY-BEACH LONG-ISLAND [NEW-YORK]		6505GR0001
NA - STATEN ISLAND FORT-WADSWORTH TO ARTHUR-KILL [NEW-YORK] BEACH EROSION CONTROL STUDY		5504GR0006
NA - HAMLIN-BEACH STATE-PARK [NEW-YORK] BEACH EROSION CONTROL STUDY		5504GR0005
NA - FAIR-HAVEN-BEACH STATE-PARK [NEW-YORK] BEACH EROSION CONTROL STUDY		5504GR0005
NA - SELKIRK-SHORES STATE-PARK [NEW-YORK] BEACH EROSION CONTROL STUDY		5403GR0002
NA - NAGARA COUNTY [NEW-YORK] BEACH EROSION STUDY		4308GR0001
NA - FIRE-ISLAND INLET TO JONES INLET LONG-ISLAND [NEW-YORK] COOPERATIVE BEACH EROSION CONTROL STUDY		5605GR0003
NEW-YORK-CITY		6506GR0001
NA - ATLANTIC COAST OF [NEW-YORK-CITY] FROM EAST ROCKAWAY INLET TO ROCKAWAY INLET AND JAMAICA-BAY NEW-YORK		4308GR0001
NIAGARA		5801GR0001
NA - [NIAGARA] COUNTY NEW-YORK BEACH EROSION STUDY		5302GR0002
NIANTIC-BAY		5800GR0002
NA - THAMES RIVER TO [NIANTIC-BAY] CONNECTICUT BEACH EROSION CONTROL STUDY		
NA - AREA - [NIANTIC-BAY] TO CONNECTICUT RIVER CONNECTICUT BEACH EROSION CONTROL STUDY		
NIEDERUNGSGEBIETE		
NA - SCHUTZ UND ENTFASSUNG DER [NIEDERUNGSGEBIETE] AN DER SCHLESWIG-HOLSTEINISCHEN OSTSEEKUSTE		
NORDERNEY		
BEACH REHABILITATION BY USE OF BEACH FILLS AND FURTHER PLANS FOR THE PROTECTION OF THE ISLAND OF [NORDERNEY]		
NA - DIE URSACHEN DER ABRUCHERSCHWUNDEN AN WEST UND NORDWESTSTRAND DER INSEL [NORDERNEY]		
NA - GUTACHTLICHE STELLUNGNAHME ZU DEN UNTERSUCHUNGEN UBER DIE URSACHEN DER ABRUCHERSCHWUNDEN AM WEST UND NORD WESTSTRAND DER INSEL [NORDERNEY]		
NA - THE EFFECT OF ISLAND PROTECTIVE STRUCTURES ON BEACH DEVELOPMENT IN WEST PART OF [NORDERNEY]		
NA - ORIGIN AND DEVELOPMENT OF ISLAND PROTECTIVE WORKS ON [NORDERNEY]		
NA - ARTIFICIAL RESTORATION OF BEACHES WITH SPECIAL REGARD FOR BEACH FLUSHING [NORDERNEY] 1951-52		
NORDSEE		
NA - HUNDERT JAHRE KUSTENSCHUTZ AN DER [NORDSEE]		
NORDWAGRIEN		
NA - GRUNDUNTERSUCHUNGEN AN DEN KUSTEN VON FEHMARN UND [NORDWAGRIEN]		
NA - KUSTENFORSCHUNGEN IM RAUM FEHMARN [NORDWAGRIEN]		
NORDWESTKUSTE		
NA - DIE ABRUCHERSCHWUNDEN AN DER [NORDWESTKUSTE] DES ELLENHOGENS AUF SYLT		
NORDWESTSTRAND		
NA - DIE URSACHEN DER ABRUCHERSCHWUNDEN AN WEST UND [NORDWESTSTRAND] DER INSEL NORDERNEY		
NORTH		
NA - WATER ECONOMY BETWEEN [NORTH] AND BALTIC-SEA KIEL		
EROSION AND PALMETTO GROINS AT [NORTH] POINT ST.AUGUSTINE FLORIDA		
SHORE EROSION AND CABBAGE PALMETTO GROINS AT [NORTH] POINT ST.AUGUSTINE FLORIDA		
BEACH BEHAVIOR [NORTH] SHORE LONG-ISLAND SOUND		
THE [NORTH] SHORE VERSUS LAKE-MICHIGAN		

NORTH-CAROLINA	6205GR0002
NA - CAROLINA-BEACH AND VICINITY (NORTH-CAROLINA)	6503GR0001
NA - OCRACOKE ISLAND (NORTH-CAROLINA)	6209GR0002
NA - FORT-MACON - ATLANTIC-BEACH AND VICINITY (NORTH-CAROLINA)	3201GR0001
NA - FORT-FISHER (NORTH-CAROLINA)	3401GR0001
NA - WRIGHTSVILLE-BEACH (NORTH-CAROLINA)	5400GR0001
PHOTOGRAPHS OF FORT-MACON NEAR MOREHEAD-CITY (NORTH-CAROLINA) AFTER SEVERAL HURRICANES IN 1954	4812GR0001
NA - [NORTH-CAROLINA] SHORE LINE BEACH EROSION STUDY	
NORTH-SEA	5700GR0004
NA - PROVISIONS FOR STABILIZATION AND MAINTENANCE OF FLOATING ISLANDS OF THE SOUTH COAST OF GERMANY (NORTH-SEA)	5800GR0005
NA - WATER ECONOMY BETWEEN (NORTH-SEA) AND BALTIC-SEA 1948-58	0000GR0003
INFLUENCE OF PROTECTIVE WORKS ON THE EROSION OF THE WEST COAST OF SYLT (NORTH-SEA) COAST OF GERMANY	3703GR0001
COAST PROTECTION ON THE (NORTH-SEA) COASTS OF HOLLAND FRANCE BELGIUM AND GERMANY	
OAHU	6503GR0004
NA - HALEIUA-BEACH (OAHU) HAWAII BEACH EROSION CONTROL STUDY	6503GR0003
NA - WAIKIKI-BEACH (OAHU) HAWAII BEACH EROSION CONTROL STUDY	5308GR0001
NA - WAIKIKI-BEACH ISLAND OF (OAHU) T. H. BEACH EROSION CONTROL STUDY	
OBSERVATIONS	7000GR0003
MODEL STUDIES IN-SITU OBSERVATIONS	5300GR0002
NA - THEORETICAL (OBSERVATIONS) FOR INSTALLATION OF COASTAL PROTECTIVE STRUCTURES ON TIDELESS SHORES	5409GR0005
(OBSERVATIONS) ON THE TRAVEL OF SHORE MATERIAL ALONG A CHALK FRESHWATER	
OCEANSIDE	5605GR0001
NA - [OCEANSIDE] OCEAN-BEACH IMPERIAL-BEACH AND CUNNINGHAM SAN-DIEGO COUNTY CALIFORNIA BEACH EROSION CONTROL STUDY	
OCEAN-BEACH STUDY	5605GR0001
NA - OCEANSIDE (OCEAN-BEACH) IMPERIAL-BEACH AND CUNNINGHAM SAN-DIEGO COUNTY CALIFORNIA BEACH EROSION CONTROL STUDY	
OCEAN-CITY	5510GR0001
MARYLANDS FAVORITE BEACH AT (OCEAN-CITY)	5905GR0001
BEHAVIOR OF SAND ASPHALT GROINS AT (OCEAN-CITY) MARYLAND	5607GR0001
INTERIM REPORT ON ASPHALT GROINS AT (OCEAN-CITY) MARYLAND	5504GR0001
THE ASPHALT GROINS AT (OCEAN-CITY) MARYLAND	5602GR0001
BEHAVIOR OF BEACH FILL AT (OCEAN-CITY) NEW-JERSEY	5306GR0003
NA - (OCEAN-CITY) NEW-JERSEY BEACH EROSION CONTROL STUDY	
OCEANOGRAPHICAL	6400GR0003
(OCEANOGRAPHICAL) ENGINEERING	
OCRACOKE	6503GR0001
NA - [OCRACOKE] ISLAND NORTH-CAROLINA	
OHIO	6101GR0002
NA - LAKE-ERIE SHORE LINE FROM THE ALCHIGAN - OHIO STATE LINE TO MARBLEHEAD (OHIO) BEACH EROSION CONTROL STUDY	6205GR0001
NA - SHORE OF SHEFFIELD-LAKE COMMUNITY PARK (OHIO) BEACH EROSION CONTROL STUDY	5304GR0002
NA - APPENDIX IV OHIO SHORE LINE OF LAKE-ERIE SANDUSKY BAY (OHIO) BEACH EROSION CONTROL STUDY	5003GR0002
NA - APPENDIX IV OHIO SHORE LINE OF LAKE-ERIE SANDUSKY TO VERMILLION (OHIO) BEACH EROSION CONTROL STUDY	5005GR0001
NA - CLEVELAND AND LAKEWOOD (OHIO) BEACH EROSION CONTROL STUDY	6500GR0003
NA - APPENDIX IX - SHORE OF LAKE-ERIE IN LAKE COUNTY (OHIO) BEACH EROSION CONTROL STUDY	
PERMEABLE AND SEMIPERMEABLE GROINS FROM (OHIO) ON LAKE-ERIE	
NA - APPENDICES III AND XII (OHIO) SHORE LINE OF LAKE-ERIE BETWEEN FAIRPORT AND ASHTABULA BEACH EROSION CONTROL STUDY	
NA - APPENDIX VIII (OHIO) SHORE LINE OF LAKE-ERIE BETWEEN VERMILLION AND SHEFFIELD-LAKE-VILLAGE BEACH EROSION CONTROL STUDY	
NA - APPENDICES V AND X (OHIO) SHORE LINE OF LAKE-ERIE BETWEEN ASHTABULA AND THE PENNSYLVANIA STATE LINE BEACH EROSION CONTROL STUDY	
NA - APPENDIX XI (OHIO) SHORE LINE OF LAKE-ERIE ECUCLIO TO CHAGRIN RIVER BEACH EROSION CONTROL STUDY	
NA - BEACH EROSION STUDY (OHIO) SHORE LINE OF LAKE-ERIE FROM OHIO - MICHIGAN STATE LINE TO MARBLEHEAD OHIO	
NA - APPENDIX IV (OHIO) SHORE LINE OF LAKE-ERIE SANDUSKY BAY OHIO BEACH EROSION CONTROL STUDY	
NA - APPENDIX IV (OHIO) SHORE LINE OF LAKE-ERIE SANDUSKY TO VERMILLION OHIO BEACH EROSION CONTROL STUDY	

OHIO (CONTINUED)
 NA - APPENDIX XIV (OHIO) SHORE LINE OF LAKE-ERIE SHEFFIELD-LAKE-VILLAGE TO ROCKY RIVER BEACH EROSION CONTROL STUDY 5304GR0003
 EFFECTS OF LARGE STRUCTURES ON THE (OHIO) SHORE OF LAKE-ERIE 6400GR0002
 EROSION PROBLEMS ON THE (OHIO) SHORE OF LAKE-ERIE 5204GR0001
 NA - LAKE-ERIE SHORE LINE FROM THE MICHIGAN - (OHIO) STATE LINE TO MARBLEHEAD OHIO BEACH EROSION CONTROL STUDY 6101GR0002
 NA - BEACH EROSION STUDY OHIO SHORE LINE OF LAKE-ERIE FROM (OHIO) - MICHIGAN STATE LINE TO MARBLEHEAD OHIO 4505GR0002
 ORANGE NA - BEACH EROSION STUDY (ORANGE) COUNTY CALIFORNIA 4002GR0001
 NA - SAN-GABRIEL RIVER TO NEWPORT-BAY (ORANGE) COUNTY CALIFORNIA APPENDIX V PHASE II BEACH EROSION CONTROL STUDY 6210GR0002
 ORCHARD-BEACH NA - STUDY OF AN ARTIFICIAL BATHING BEACH AT (ORCHARD-BEACH) PELHAM-BAY NEW-YORK 3711GR0002
 ORIGIN NA - (ORIGIN) AND DECLINE OF THE ISLAND IRISHCHEN 5000GR0002
 NA - (ORIGIN) AND DEVELOPMENT OF ISLAND PROTECTIVE WORKS ON NORDERNEY 5500GR0006
 NA - HELGOLAND HISTORY OF ITS (ORIGIN) AND MAINTENANCE OF ITS HARBOR RELATIVE TO NAVIGATION 5500GR0009
 THE (ORIGIN) AND STABILITY OF BEACHES 5712GR0003
 OSTSEEKUSTE NA - ABBRUCH UND SCHUTZ DER STEILUFER AN DER (OSTSEEKUSTE) 5200GR0003
 NA - SCHUTZ UND ENTWASSERUNG DER NIEDERUNGSGEBIETE AN DER SCHLESWIG-HOLSTEINISCHEN (OSTSEEKUSTE) 5800GR0002
 PALMETTO SHORE EROSION AND CABBAGE (PALMETTO) GROINS AT NORTH POINT ST-AUGUSTINE FLORIDA 3811GR0001
 EROSION AND (PALMETTO) GROINS AT NORTH POINT ST-AUGUSTINE FLORIDA 3912GR0001
 PALM-BEACH NA - (PALM-BEACH) COUNTY FLORIDA FROM MARTIN COUNTY LINE TO LAKE-WORTH INLET AND FROM SOUTH-LAKE-WORTH INLET TO BROWARD COUNTY LINE BEACH EROSION CONTROL STUDY 6105GR0002
 NA - (PALM-BEACH) COUNTY FROM LAKE-WORTH INLET TO SOUTH-LAKE-WORTH INLET FLORIDA BEACH EROSION CONTROL STUDY 5712GR0004
 DETERIORATION OF STEEL SHEET PILE GROINS AT (PALM-BEACH) FLORIDA 4910GR0001
 EXPERIMENTAL STEEL SHEET PILE GROINS (PALM-BEACH) FLORIDA 4800GR0001
 NA - (PALM-BEACH) FLORIDA BEACH EROSION STUDY 4812GR0005
 PARK NA - BEACH EROSION AT JACOB-RITTS (PARK) LONG-ISLAND NEW-YORK 3601GR0002
 NA - SHORE OF SHEFFIELD-LAKE COMMUNITY (PARK) OHIO BEACH EROSION CONTROL STUDY 6205GR0001
 PARTICLE EFFECT OF (PARTICLE) SIZE AND DISTRIBUTION ON STABILITY OF ARTIFICIALLY FILLED BEACH PRESQUE-ISLE PENINSULA PENNSYLVANIA 6805GR0001
 PARTICLES MOTION OF SAND (PARTICLES) BETWEEN GROINS 5812GR0001
 PATENT NA - (PATENT) NO 19786 3512GR0002
 PAWCATUCK NA - AREA 5 (PAWCATUCK) RIVER TO THAMES RIVER CONNECTICUT BEACH EROSION CONTROL STUDY 5212GR0001
 PELHAM-BAY NA - STUDY OF AN ARTIFICIAL BATHING BEACH AT ORCHARD-BEACH (PELHAM-BAY) NEW-YORK 3711GR0002
 PEMBERTON NA - SHORE BETWEEN (PEMBERTON) POINT AND CAPE-COD MASSACHUSETTS BEACH EROSION CONTROL STUDY 5910GR0001
 PENINSULA FEEDER BEACHES AND GROINS RESTORE PRESQUE-ISLE (PENINSULA) 5803GR0001
 BEACH PROTECTION ENGINEERS ATTEMPT TO OUTWIT NATURE AT PRESQUE-ISLE (PENINSULA) 5109GR0001
 NA - PRESQUE-ISLE (PENINSULA) ERIE PENNSYLVANIA BEACH EROSION CONTROL STUDY 5308GR0004
 NA - PRESQUE-ISLE (PENINSULA) ERIE PENNSYLVANIA BEACH EROSION CONTROL STUDY 5005GR0002
 EFFECT OF PARTICLE SIZE AND DISTRIBUTION ON STABILITY OF ARTIFICIALLY FILLED BEACH PRESQUE-ISLE (PENINSULA) PENNSYLVANIA 6805GR0001
 CASE HISTORY OF SHORE PROTECTION AT PRESQUE-ISLE (PENINSULA) PENNSYLVANIA 5210GR0003

PENNSYLVANIA	6805GR0001
EFFECT OF PARTICLE SIZE AND DISTRIBUTION ON STABILITY OF ARTIFICIALLY FILLED BEACH PRESQUE-ISLE PENINSULA (PENNSYLVANIA)	5210GR0003
CASE HISTORY OF SHORE PROTECTION AT PRESQUE-ISLE PENINSULA (PENNSYLVANIA)	5308GR0004
NA - PRESQUE-ISLE PENINSULA ERIE (PENNSYLVANIA) BEACH EROSION CONTROL STUDY	5005GR0002
NA - PRESQUE-ISLE PENINSULA ERIE (PENNSYLVANIA) BEACH EROSION CONTROL STUDY	5201GR0003
NA - APPENDICES A AND A OHIO SHORE LINE OF LAKE-ERIE BETWEEN ASHTABULA AND THE (PENNSYLVANIA) STATE LINE BEACH EROSION CONTROL STUDY	0000GR0008
PERMEABILITY	6500GR0003
THE PRINCIPLE OF INCREASING (PERMEABILITY) IN GROIN CONSTRUCTION	6009GR0001
PERMEABLE	0000GR0005
(PERMEABLE) AND SEMIPERMEABLE GROINS FROM OHIO ON LAKE-ERIE	0000GR0006
SCOURING DUE TO WAVE ACTION AT THE TUE OF (PERMEABLE) COASTAL STRUCTURES	5700GR0001
THE WISENITZ PRECAST (PERMEABLE) GROIN	3907GR0001
THE BUDD HORIZONTALLY (PERMEABLE) GROIN SYSTEM FOR BEACH EROSION CONTROL AND REBUILDING SAND BEACHES	4001GR0001
IMPERMEABLE AND (PERMEABLE) GROINS	6500GR0002
SHORE PROTECTION BY (PERMEABLE) GROINS	3500GR0001
(PERMEABLE) GROINS AT KENOSHA WISCONSIN	4507GR0001
(PERMEABLE) GROINS FROM ILLINOIS ON LAKE-MICHIGAN	3911GR0001
NA - (PERMEABLE) GROINS OF CONCRETE CHECK BEACH EROSION	6505GR0002
(PERMEABLE) JETTIES BUILT TO PROTECT CLEVELAND'S SHORE	7009GR0002
EFFECTIVENESS OF (PERMEABLE) TYPE GROINS USED FOR BEACH PROTECTION AT SHOREWOOD WISCONSIN AND OTHER CITIES	5705GR0001
ALONG THE WEST SHORE OF LAKE-MICHIGAN	5500GR0001
PERT-A-MOY	5705GR0002
NA - (PERT-A-MOY) NEW-JERSEY BEACH EROSION CONTROL STUDY	6305GR0001
PHENOMENA	6208GR0001
SOME SAND TRANSPORT (PHENOMENA) ON COASTS WITH BARS	6410GR0001
PHOTOGRAPHS	4602GR0002
(PHOTOGRAPHS) OF CUMPO-BEACH WESTPORT CONNECTICUT AFTER GROIN CONSTRUCTION AND BEFORE FILL PLACEMENT	4910GR0001
(PHOTOGRAPHS) OF FORT-MACON NEAR MOREHEAD-CITY NORTH-CAROLINA AFTER	4800GR0001
(PHOTOGRAPHS) OF SARASOTA COUNTY FLORIDA SHOWING GROIN INSTALLATION	3306GR0001
(PHOTOGRAPHS) OF SASSCO-HILL-BEACH FAIRFIELD CONNECTICUT AFTER GROIN CONSTRUCTION AND BEFORE FILL PLACEMENT	5210GR0002
AERIAL (PHOTOGRAPHS) OF WALLIS-SAND STATE-BEACH RYE NEW-HAMPSHIRE	3607GR0002
AERIAL (PHOTOGRAPHS) PLUM ISLAND MASSACHUSETTS	4410GR0001
PICTORIAL	6210GR0001
A (PICTORIAL) HISTORY OF SELECTED STRUCTURES ALONG THE NEW-JERSEY COAST	5202GR0001
PIERS	6610GR0001
(PIERS) AND JETTIES OF PRECAST CONCRETE	5404GR0001
PILE	6606GR0002
DETERIORATION OF STEEL SHEET (PILE) GROINS AT PALM-BEACH FLORIDA	5800GR0007
EXPERIMENTAL STEEL SHEET (PILE) GROINS PALM-BEACH FLORIDA	4910GR0003
DU-PLAT-TAYLOR ADJUSTABLE SCREW (PILE) GROINS	6008GR0005
LIFE OF STEEL SHEET (PILE) STRUCTURES IN ATLANTIC COASTAL STATES	
PILING	
INVESTIGATIONS OF STEEL SHEET (PILING)	
STEEL SHEET (PILING) FOR SHORE AND BEACH PROTECTION STRUCTURES	
SHEET STEEL (PILING) FOR SHORE PROTECTION STRUCTURES	
DURABILITY OF STEEL SHEET (PILING) IN SHORE STRUCTURES	
PINELLAS	
NA - (PINELLAS) COUNTY FLORIDA	
NA - (PINELLAS) COUNTY FLORIDA BEACH EROSION CONTROL STUDY	
PLANNING	
SHORE PROTECTION (PLANNING) AND DESIGN	
NA - SWELL AND SURGE AS BASIS FOR (PLANNING) AND DESIGN IN SEA STRUCTURES AND COASTAL PROTECTION	
(PLANNING) SHORE PROTECTION	
PLANS	
BEACH REHABILITATION BY USE OF BEACH FILLS AND FURTHER (PLANS) FOR THE PROTECTION OF THE ISLAND OF NORDERNEY	

PLUM	AERIAL PHOTOGRAPHS (PLUM) ISLAND MASSACHUSETTS	6208GR0001
POINT	NA - (PLUM) ISLAND MASSACHUSETTS BEACH EROSION CONTROL STUDY	5308GR0002
	NA - SHORE BETWEEN PENDERTON (POINT) AND CAPE-COD MASSACHUSETTS BEACH EROSION CONTROL STUDY	5910GR0001
	NA - BELLE-PASS TO RACQUON (POINT) LOUISIANA BEACH EROSION CONTROL STUDY	6202GR0001
	REPORT ON SHORE EROSION AT TILGHMAN (POINT) MARYLAND	4006GR0001
	NA - APPENDIX I COAST OF CALIFORNIA CARPENTERIA TO (POINT) MUGU BEACH EROSION CONTROL STUDY	5211GR0007
	NA - APPENDIX II COAST OF CALIFORNIA (POINT) MUGU TO SAN-PEORO BREAKWATER BEACH EROSION CONTROL STUDY	5311GR0002
	NA - CLARK (POINT) NEW-REDFORD MASSACHUSETTS BEACH EROSION CONTROL STUDY	6205GR0003
	SHORE EROSION AND CABBAGE PALMETTO GROINS AT NORTH (POINT) ST-AUGUSTINE FLORIDA	3811GR0001
	SHORE AND PALMETTO GROINS AT NORTH (POINT) ST-AUGUSTINE FLORIDA	3912GR0001
POMPANO-BEACH	NA - APPENDIX VI HUMBOLDT-BAY (BURNIE (POINT)) CALIFORNIA BEACH EROSION CONTROL STUDY	5709GR0001
POMPAUO-BEACH	COASTAL ENGINEERING STUDY AT (POMPANO-BEACH)	5903GR0002
PRAIAS	NA - PROTECCAO DA COSTA CONTRA A EROSAO MARITIMA E FORMACAO DE (PRAIAS) DE ARCIA - DOIS PROBLEMAS NA COSTA DE MOCAMBIQUE	6400GR0004
PRECAST	PIERS AND JETTIES OF (PRECAST) CONCRETE	4602GR0002
	(PRECAST) CONCRETE BLOCK GROINS	5304GR0001
PRESERVATION	THE WISENITZ (PRECAST) PERMEABLE GROIN	0000GR0005
PRESQUE-ISLE	THE PROTECTION AND (PRESERVATION) OF THE ATLANTIC SHORE FRONT OF THE STATE OF NEW-YORK	6207GR0002
	FEDER BEACHES AND GROINS RESTORE (PRESQUE-ISLE) PENINSULA	5803GR0001
	BEACH PROTECTION ENGINEERS ATTEMPT TO OUTFIT NATURE AT (PRESQUE-ISLE) PENINSULA	5109GR0001
	NA - (PRESQUE-ISLE) PENINSULA ERIE PENNSYLVANIA BEACH EROSION CONTROL STUDY	5308GR0004
	NA - (PRESQUE-ISLE) PENINSULA ERIE PENNSYLVANIA BEACH EROSION CONTROL STUDY	5005GR0002
	EFFECT OF PARTICLE SIZE AND DISTRIBUTION ON STABILITY OF ARTIFICIALLY FILLED BEACH (PRESQUE-ISLE) PENINSULA PENNSYLVANIA	6805GR0001
PREVENTION	CASE HISTORY OF SHORE PROTECTION AT (PRESQUE-ISLE) PENINSULA PENNSYLVANIA	5210GR0003
	THE (PREVENTION) OF COAST EROSION	4000GR0003
	THE (PREVENTION) OF COAST EROSION	4104GR0001
PRICES	.HOW TO BUILD A BEACH AT ECONOMY (PRICES)	5509GR0001
PRINCIPLE	THE (PRINCIPLE) OF INCREASING PERMEABILITY IN GROIN CONSTRUCTION	0000GR0008
PRINCIPLES	(PRINCIPLES) OF SHORE PROTECTION FOR THE GREAT-LAKES	5310GR0002
PROBLEM	LITTORAL DRIFT (PROBLEM) AT SHORE-LINE HARBOURS	5900GR0003
	THE (TERMINAL) (PROBLEM) IN COAST PROTECTION	6409GR0005
	THE (PROBLEM) OF COAST EROSION	4700GR0001
PROBLEMS	NA - SOME IDEAS ON THE (PROBLEM) OF RESEARCH IN COASTAL DYNAMICS AND MODEL TESTS OF COASTAL PROTECTION	5600GR0001
	NA - PROTECCAO DA COSTA CONTRA A EROSAO MARITIMA E FORMACAO DE PRAIAS DE ARCIA - DOIS (PROBLEMAS) NA COSTA DE MOCAMBIQUE	6400GR0004
PROBLEMS	CHARACTERISTICS OF SHINGLE BEACHES: THE SOLUTION TO SOME PRACTICAL (PROBLEMS)	7009GR0006
	FLORIDA COASTAL (PROBLEMS)	5712GR0001
	CALIFORNIA BEACH EROSION AND DEVELOPMENT (PROBLEMS)	3610GR0001
	THE DANISH WESTCOAST - LITTORAL DRIFT (PROBLEMS) AND MEASURES AGAINST COAST EROSION	5008GR0001
	(PROBLEMS) DE DEFENSE DES COTES RESUSITE DE ECHECS DE QUELQUES OUVRAGES	5409GR0003
	SOME COASTAL ENGINEERING (PROBLEMS) IN INDIA	5712GR0002
	COASTAL PROTECTION WORKS AND RELATED (PROBLEMS) IN JAPAN	6008GR0004

PROBLEMS (CONTINUED)		
ROUND-TABLE DISCUSSION OF SHORE PROBLEMS IN RELATION TO RECREATION		3710GR0001
NA - ACTUAL PROBLEMS OF COASTAL PROTECTION		5400GR0003
NA - PROBLEMS OF ISLAND AND COAST PROTECTION		4500GR0001
EROSION PROBLEMS ON THE WINDY SHORE OF LAKE-ERIE		5204GR0001
PROCEDURES		
COASTAL PROTECTION PROCESSES WITH SPECIAL REFERENCE TO CONDITIONS IN FLORIDA		6412GR0001
PROCESSES		
COASTAL PROCESSES		6606GR0001
GENERALITIES ON COASTAL PROCESSES AND PROTECTION		5903GR0003
LITTORAL PROCESSES AND THE DEVELOPMENT OF SHORELINES		6510GR0004
LITTORAL PROCESSES ON SANDY COASTS		5010GR0002
PROFILE		
STABILIZATION OF SINGLE ALLUVIAL SHORES BY GROINS OF FULL PROFILE		6400GR0001
PROFILES		
COAST EROSION AND THE DEVELOPMENT OF BEACH PROFILES		5406GR0001
THE DEVELOPMENT OF COAST PROFILES ON A RECEIVING COAST PROTECTED BY GROYNES		6008GR0002
PROJECT		
UNFINISHED BUSINESS NEW-JERSEY GROIN PROJECT STALLED BY WINTER		5904GR0001
PROJECTS		
PARTICIPATION OF FEDERAL RELIEF AGENCIES IN BEACH PROTECTION PROJECTS		3607GR0001
PROSPECT-BEACH		
BEHAVIOR OF BEACH FILL AND BORROW AREA AT PROSPECT-BEACH WEST-HAVEN CONNECTICUT		6108GR0001
PROTECCAO		
NA - PROTECCAO DA COSTA CONTRA A ERUSAO MARITIMA E FURMACAO DE PRAIAS DE ARCIA - DOIS PROBLEMAS NA COSTA DE MOCAMBIQUE		6400GR0004
PROTECT		
PERMEABLE JETTIES BUILT TO PROTECT CLEVELANDS SHORE		4507GR0001
PROTECTED		
ONE ASPECT OF THE DYNAMICS OF A COAST PARTLY PROTECTED BY A ROW OF GROYNES		0000GR0001
THE DEVELOPMENT OF COAST PROFILES ON A RECEIVING COAST PROTECTED BY GROYNES		6008GR0002
PROTECTING		
(PROTECTING) GALVESTON-BEACH		3807GR0005
(PROTECTING) OUR SHORE LINE		5812GR0002
PROTECTION		
THE TERMINAL PROBLEM IN COAST PROTECTION		6809GR0005
STRUCTURES FOR SHORE PROTECTION		6307GR0003
EXPERIMENT IN SHORE PROTECTION		7105GR0001
USE OF CONCRETE FOR SHORE PROTECTION		6204GR0002
NA - ACTUAL PROBLEMS OF COASTAL PROTECTION		5400GR0003
NA - BIOLOGICAL HELP IN COASTAL PROTECTION		5800GR0001
CONCRETE SHORE PROTECTION		5500GR0001
GENERALITIES ON COASTAL PROCESSES AND PROTECTION		5903GR0003
COASTAL DEVELOPMENT AND COASTAL PROTECTION		5511GR0001
NA - SUITABILITY OF MODEL TESTS IN MARITIME ENGINEERING IN HARBORS SEAWAYS AND COASTAL PROTECTION		5600GR0006
NA - SOME IDEAS ON THE PROBLEM OF RESEARCH IN COASTAL DYNAMICS AND MODEL TESTS OF COASTAL PROTECTION		5800GR0007
NA - SWELL AND SURGE AS BASIS FOR PLANNING AND DESIGN IN SEA STRUCTURES AND COASTAL PROTECTION		5700GR0013
NA - POSSIBILITIES AND LIMITS FOR APPLICATION OF ASPHALT TYPES OF CONSTRUCTIONS FOR COASTAL PROTECTION		4910GR0003
PLANNING SHORE PROTECTION		5200GR0001
NA - UNDERWATER LONGITUDINAL WORKS FOR COASTAL PROTECTION		4904GR0001
COAST PROTECTION		0800GR0001
COAST EROSION AND FORESHORE PROTECTION		4510GR0001
ART OF BEACH PROTECTION		4500GR0001
NA - PROBLEMS OF ISLAND AND COAST PROTECTION		3601GR0001
CERTAIN POINTS ABOUT EROSION COSTS AND MEASURES OF PROTECTION		5600GR0005
NA - FLOOD PROTECTION AND COAST STABILIZATION		
THE PROTECTION AND IMPROVEMENT OF FORESHORES BY THE UTILIZATION OF TIDAL AND WAVE ACTION		0306GR0001

PROTECTION

(CONTINUED)

THE (PROTECTION) AND PRESERVATION OF THE ATLANTIC SHORE FRONT OF THE STATE OF NEW-YORK
 NA - COASTAL (PROTECTION) AND SCIENTIFIC BASIS OF RESEARCH
 CASE HISTORY OF SHORE (PROTECTION) AT PRESQUE-ISLE PENNSYLVANIA
 EFFECTIVENESS OF PERMEABLE TYPE GROINS USED FOR BEACH (PROTECTION) AT SHOREWOOD WISCONSIN AND OTHER CITIES
 ALONG THE WEST SHORE OF LAKE-MICHIGAN
 REVIEW OF GERMAN EXPERIENCE ON COASTAL (PROTECTION) BY GROINS
 SHORE (PROTECTION) BY PERMEABLE GROINS
 NA - (PROTECTION) DES COTES D'UNRE LERUSION MARITIME ET FORMATION DES PLAGES DE SABLE
 BEACH (PROTECTION) ENGINEERS ATTEMPT TO OUTWIT NATURE AT PRESQUE-ISLE PENNSYLVANIA
 SHORE (PROTECTION) EXPERIENCE IN THE UNITED-STATES
 COASTAL (PROTECTION) FOR FLORIDA
 PRINCIPLES OF SHORE (PROTECTION) FOR THE GREAT-LAKES
 SOME ASPECTS OF SHORE (PROTECTION) IN BOSION HARBOR
 INFORMATION ON BEACH (PROTECTION) IN FLORIDA
 COASTAL (PROTECTION) IN MASSACHUSETTS
 REPORT OF ADVISORY-BUARD ON BEACH (PROTECTION) LOS-ANGELES COUNTY
 BEACH (PROTECTION) MEASURES
 REACH (PROTECTION) METHODS AND MATERIALS
 (PROTECTION) OF COASTS AGAINST THE SEA WITH OR WITHOUT PREPONDERATING COASTAL DRIFT OF MATERIALS
 GALVESTON ISLAND SHORELINE AND THE (PROTECTION) OF GALVESTON-BEACH
 NA - WHAT HAPPENED TO (PROTECTION) OF OUR BALTIC-SEA COAST
 CONSTRUCTION WORKS FOR THE (PROTECTION) OF THE COASTS
 NA - COASTAL CHANGES AND COASTAL (PROTECTION) OF THE ISLAND HIDDENSEE
 BEACH REHABILITATION BY USE OF BEACH FILLS AND FURTHER PLANS FOR THE (PROTECTION) OF THE ISLAND OF NORDERNEY
 NA - GENERAL COASTAL DYNAMICS AND COASTAL (PROTECTION) OF THE SOUTH BALTIC-SEA BETWEEN TRAVE AND SWINE
 NA - (PROTECTION) OF THE WEST BEACH OF SYLT ISLAND BY FLAT GROINS
 SEA DEFENCE EROSION AND (PROTECTION) ON A SANDY COAST
 NA - ISLAND (PROTECTION) ON EAST FRIESIAN COAST
 COAST EROSION AND (PROTECTION) ON LONG-ISLAND AND NEW-JERSEY
 SHORE (PROTECTION) ON THE COAST OF YALZU
 COAST (PROTECTION) ON THE NORTH-SEA COASTS OF HOLLAND FRANCE BELGIUM AND GERMANY
 SHORE (PROTECTION) PLANNING AND DESIGN
 COASTAL (PROTECTION) PROCEDURES WITH SPECIAL REFERENCE TO CONDITIONS IN FLORIDA
 PARTICIPATION OF FEDERAL RELIEF AGENCIES IN BEACH (PROTECTION) PROJECTS
 COASTAL (PROTECTION) REVIEW OF METHODS FOR DEFENCE
 THE SELSEY COAST (PROTECTION) SCHEME
 COAST (PROTECTION) SOME RECENT WORKS ON THE EAST COAST 1942-52
 SHEET STEEL PILING FOR SHORE (PROTECTION) STRUCTURES
 STEEL SHEET PILING FOR SHORE AND BEACH (PROTECTION) STRUCTURES
 CONCRETE SHORE (PROTECTION) STRUCTURES
 LOW COST SHORE (PROTECTION) USED ON THE GREAT-LAKES
 SOME DATA ON BEACH (PROTECTION) WORKS
 COASTAL (PROTECTION) WORKS AND RELATED PROBLEMS IN JAPAN
 BEACH EROSION AND (PROTECTION) WORKS IN IMAZU-SAKANO-BEACH
 (PROTECTION) WORKS ON THE MEXICAN COAST THE CREATION OF BEACHES AND DUNES
 COAST (PROTECTION) - GROINE SYSTEMS
 NA - COAST (PROTECTION) - GROINES
 COAST EROSION AND (PROTECTION) - STUDIES IN CAUSES AND REMEDIES
 PROTECTIVE
 ART OF FORMING (PROTECTIVE) BEACHES
 NA - BEACH ABRASION BY WAVES - REFLECTION ON STEEP WALL TYPE OF COASTAL (PROTECTIVE) STRUCTURES
 NA - THE EFFECT OF ISLAND (PROTECTIVE) STRUCTURES ON BEACH DEVELOPMENT IN WEST PART OF NORDERNEY
 NA - EFFECTS OF COASTAL (PROTECTIVE) STRUCTURES ON SYLT
 NA - THEORETICAL OBSERVATIONS FOR INSTALLATION OF COASTAL (PROTECTIVE) STRUCTURES ON TIDELESS SHORES
 SHORE (PROTECTIVE) WORK AT WINTHROP MASSACHUSETTS

6207GR0002
 5700GR0012
 5210GR0003
 3911GR0001
 6307GR0002
 3907GR0001
 6410GR0002
 5109GR0001
 6707GR0001
 6310GR0001
 5310GR0002
 5210GR0004
 5210GR0008
 6010GR0002
 3012GR0001
 4206GR0001
 4210GR0001
 4410GR0002
 3202GR0001
 3807GR0002
 5600GR0002
 6300GR0002
 5600GR0007
 6008GR0005
 5400GR0005
 6006GR0002
 2712GR0001
 5600GR0003
 1508GR0001
 6609GR0002
 3703GR0001
 6606GR0002
 6412GR0001
 3607GR0001
 5311GR0001
 6112GR0001
 5306GR0001
 6210GR0001
 4410GR0001
 4410GR0003
 5310GR0001
 3605GR0001
 6008GR0004
 6112GR0002
 5701GR0001
 6204GR0004
 6106GR0003
 5200GR0002
 3309GR0001
 5500GR0005
 5500GR0008
 5700GR0011
 5300GR0002
 3807GR0003

PROTECTIVE	(CONTINUED)	3806GR0001
SHORE (PROTECTIVE) WORK AT WINTHROP MASSACHUSETTS		4806GR0001
PAPER ON (PROTECTIVE) WORKS ADAPTED TO LIMIT EROSION ALONG THE OPEN COAST HOW THEY WORK		5806GR0006
NA - ORIGIN AND DEVELOPMENT OF ISLAND (PROTECTIVE) WORKS ON NORDERNEY		5806GR0003
NA - DUNE (PROTECTIVE) WORKS ON SYLT		0006GR0003
INFLUENCE OF (PROTECTIVE) WORKS ON THE EROSION OF THE WEST COAST OF SYLT NORTH-SEA COAST OF GERMANY		
PROTECTS		
SHOREWOOD (PROTECTS) ITS LAKE FRONT		3807GR0004
PUBLIC		
CONEY ISLAND (PUBLIC) BEACH AND BOARDWALK IMPROVEMENT		2306GR0001
CONSTRUCTION AND MAINTENANCE OF THE (PUBLIC) BEACH AT HOCKAWAY-BEACH BOROUGH OF QUEENS		3610GR0002
PUERTO-RICO		
NA - SAN-JUAN (PUERTO-RICO) BEACH EROSION CONTROL STUDY		6209GR0001
PUNTA-LAS-MARIAS		
NA - [PUNTA-LAS-MARIAS] SAN-JUAN P. R. BEACH EROSION CONTROL STUDY		4812GR0002
QUEENS		
CONSTRUCTION AND MAINTENANCE OF THE PUBLIC BEACH AT HOCKAWAY-BEACH BOROUGH OF [QUEENS]		3610GR0002
QUINCY-SHORE-BEACH		
NA - [QUINCY-SHORE-BEACH] MASSACHUSETTS BEACH EROSION CONTROL STUDY		5105GR0002
RACCOON		
NA - BELLE-PASS TO [RACCOON] POINT LOUISIANA BEACH EROSION CONTROL STUDY		6202GR0001
RACINE		
NA - [RACINE] COUNTY WISCONSIN BEACH EROSION CONTROL STUDY		5302GR0001
RARITAN-BAY		
NA - [RARITAN-BAY] AND SANDY-HOOK-BAY NEW-JERSEY		6206GR0003
RATE		
LABORATORY STUDY OF THE EFFECT OF GROINS ON THE [RATE] OF LITTORAL TRANSPORT EQUIPMENT DEVELOPMENT AND INITIAL TESTS		5906GR0001
REBUILDING		
THE BUDD HORIZONTALLY PERMEABLE GROIN SYSTEM FOR BEACH EROSION CONTROL AND [REBUILDING] SAND BEACHES		0000GR0006
RECEDING		
THE DEVELOPMENT OF COAST PROFILES ON A [RECEDING] COAST PROTECTED BY GROYNES		6008GR0002
[RECEDING] OF SHORELINE AT CUCHIN BY GROYNES AND A SEAWALL		5900GR0004
RECENT		
[RECENT] STORM DAMAGE ALONG THE COASTS OF FLORIDA AND MISSISSIPPI		4801GR0001
COAST PROTECTION SOME [RECENT] WORKS ON THE EAST COAST 1942-52		5306GR0001
RECLAIMED		
SOME SEA DEFENCE WORKS FOR [RECLAIMED] LANDS		4602GR0001
RECLAMATION		
NA - CULTIVATED LAND CONSERVATION AND [RECLAMATION]		5900GR0006
LAND [RECLAMATION] AND GROIN-BUILDING IN THE TIDAL FLATS		7009GR0004
RECREATION		
ROUND-TABLE DISCUSSION OF SHORE PROBLEMS IN RELATION TO [RECREATION]		3710GR0001
REGION		
NA - GROINS WITH ASPHALT GROUT IN EAST FRIESIAN COAST (REGION)		5900GR0002
NA - MODEL TESTS OF WAVE RUN-UP ON SEA DYKES IN WATT (REGION)		5400GR0004
REHABILITATION		
BEACH (REHABILITATION) BY USE OF BEACH FILLS AND FURTHER PLANS FOR THE PROTECTION OF THE ISLAND OF NORDERNEY		6008GR0005
RELIEF		
PARTICIPATION OF FEDERAL [RELIEF] AGENCIES IN BEACH PROTECTION PROJECTS		3607GR0001
REMEDIES		
COAST EROSION AND PROTECTION - STUDIES IN CAUSES AND [REMEDIES]		5200GR0002
REPORT		
[REPORT] OF ADVISORY-BUARO ON BEACH PROTECTION LOS-ANGELES COUNTY		3012GR0001
[REPORT] OF THE FORESHORE-EROSION-BUARD		3612GR0001
INTERIM [REPORT] ON ASPHALT GROINS AT OCEAN-CITY MARYLAND		5607GR0001
[REPORT] ON BEACH EROSION AT HOLLYWOOD-BEACH FLORIDA		3801GR0001

REPORT

(CONTINUED)

NA - (REPORT) ON CONCRETE BLOCK GROINS
 NA - BEACH EROSION CONTROL (REPORT) ON COOPERATIVE STUDY OF VIRGINIA AND BISCAYNE KEYS FLORIDA
 (REPORT) ON EROSION AT MANASQUAN INLET NEW-JERSEY AND ADJACENT BEACHES
 (SUMMARY) ON SHORE EROSION AT TILGHMAN POINT MARYLAND
 (SUMMARY) (REPORT) ON STUDIES OF SAND TRANSPORTATION BY WAVE ACTION
 (REPORT) ON ST. SIMON ISLAND STUDIES
 NA - (REPORT) ON THE USE OF ASPHALT AT GROIN CONSTRUCTION IN DELFTLAND (HOLLAND)
 NA - COAST OF SOUTHERN CALIFORNIA - SPECIAL INTERIM (REPORT) ON THE VENTURA AREA COOPERATIVE BEACH EROSION CONTROL STUDY

(REPORT) TO THE 15TH INTERNATIONAL NAVIGATION CONGRESS
 (REPORT) TO THE 15TH INTERNATIONAL NAVIGATION CONGRESS
 NA - (REPORT) TO THE 17TH INTERNATIONAL NAVIGATION CONGRESS
 (REPORT) TO THE 17TH INTERNATIONAL NAVIGATION CONGRESS
 (REPORT) TO THE 17TH INTERNATIONAL NAVIGATION CONGRESS
 NA - (REPORT) TO THE 17TH INTERNATIONAL NAVIGATION CONGRESS
 (REPORT) TO THE 17TH INTERNATIONAL NAVIGATION CONGRESS
 NA - (REPORT) TO THE 17TH INTERNATIONAL NAVIGATION CONGRESS
 (REPORT) TO THE 17TH INTERNATIONAL NAVIGATION CONGRESS
 (REPORT) TO THE 17TH INTERNATIONAL NAVIGATION CONGRESS
 (REPORT) TO THE 18TH INTERNATIONAL NAVIGATION CONGRESS
 (REPORT) TO THE 21ST INTERNATIONAL NAVIGATION CONGRESS
 (REPORT) TO THE 22ND INTERNATIONAL NAVIGATION CONGRESS
 (REPORT) TO THE 22ND INTERNATIONAL NAVIGATION CONGRESS
 NA - (REPORT) TO THE 22ND INTERNATIONAL NAVIGATION CONGRESS

RESEARCH

NA - COASTAL PROTECTION AND SCIENTIFIC BASIS OF (RESEARCH)
 NA - WHAT WATER ECONOMY EXPECTS FROM COASTAL (RESEARCH)
 NA - SOME IDEAS ON THE PROBLEM OF (RESEARCH) IN COASTAL DYNAMICS AND MODEL TESTS OF COASTAL PROTECTION

RESTORATION

NA - ARTIFICIAL (RESTORATION) OF BEACHES WITH SPECIAL REGARD FOR BEACH FLUSHING NORDERNEY 1951-52

RESTORE

FEEDER BEACHES AND GROINS (RESTORE) PRESQUE-ILE PENINSULA

RESUSCITE

PROBLEMS DE DEFENSE DES COTES (RESUSCITE) DE ECHECS DE QUELQUES OUVRAGES

RETAINING

CURVED JETTIES SEA-WALLS BULKHEADS AND (RETAINING) WALLS

REVERE-BEACH

NA - (REVERE-BEACH) MASSACHUSETTS BEACH EROSION CONTROL STUDY

REVENMENTS

NA - (REVERE-BEACH) MASSACHUSETTS BEACH EROSION CONTROL STUDY

REVIEW

NA - SEA DEFENCE WORKS - GROINS AND (REVENMENTS)

(REVIEW) OF BEACH EROSION AND STORM TIDE CONDITIONS IN FLORIDA 1961-1962

(REVIEW) OF GERMAN EXPERIENCE ON COASTAL PROTECTION BY GROINS

RHODE-ISLAND

COASTAL PROTECTION (REVIEW) OF METHODS FOR DEFENCE

NA - WESTERLY (RHODE-ISLAND)

NA - SOUTH-KINGSTON AND WESTERLY (RHODE-ISLAND) BEACH EROSION CONTROL STUDY

RIPARAN

NA - SOUTH SHORE STATE OF (RHODE-ISLAND) BEACH EROSION CONTROL STUDY

RIVER

MARITIME AND (RIPARIAN) USE OF GABIONS

NA - APPENDIX XI OHIO SHORE LINE OF LAKE-ERIE EUCLID TO CHAGRIN (RIVER) BEACH EROSION CONTROL STUDY

NA - APPENDIX XIV OHIO SHORE LINE OF LAKE-ERIE SHEFFIELD-LAKE-VILLAGE TO ROCKY (RIVER) BEACH EROSION CONTROL STUDY

NA - NEW-JERSEY COAST OF DELAWARE-BAY FROM CAPE-MAY-CANAL TO MAURICE (RIVER) BEACH EROSION CONTROL STUDY

NA - AREAS 8 AND 11 SAUGATUCK RIVER TO BYRAM (RIVER) CONNECTICUT BEACH EROSION CONTROL STUDY

5205GR0001
 6205GR0004
 3801GR0002
 4005GR0001
 5201GR0001
 4101GR0001
 4600GR0001

6205GR0002
 3100GR0002
 3100GR0001
 4900GR0002
 4900GR0004
 4900GR0005
 4900GR0006
 4900GR0001

4900GR0007
 4900GR0003
 5300GR0004
 6500GR0004
 6900GR0001
 6900GR0004
 6900GR0003

5700GR0012
 5500GR0004
 5600GR0001
 5700GR0014

5803GR0001

5409GR0003

4001GR0002

5105GR0001

5105GR0003

6705GR0002

6211GR0001

6307GR0002

5311GR0001

6502GR0002

5805GR0001

5002GR0002

6512GR0001

5402GR0001

5304GR0003

6106GR0001

5705GR0003

RIVER	(CONTINUED)		
NA - AREA 3	- NEW-HAVEN HARBOR TO HOUSATONIC [RIVER] CONNECTICUT BEACH EROSION CONTROL STUDY	5306GR0002	
NA - AREA 6	- NIANTIC-BAY TO CONNECTICUT [RIVER] CONNECTICUT BEACH EROSION CONTROL STUDY	5302GR0002	
NA - AREA 4	- CONNECTICUT RIVER TO HAMMONASSET [RIVER] CONNECTICUT BEACH EROSION CONTROL STUDY	5206GR0001	
NA - AREA 2	- HAMMONASSET RIVER TO EAST [RIVER] CONNECTICUT BEACH EROSION CONTROL STUDY	5002GR0001	
NA - AREA 5	- PAWCATUCK RIVER TO THAMES [RIVER] CONNECTICUT BEACH EROSION CONTROL STUDY	5212GR0001	
NA - AREA 1	- ASH CREEK TO SAUGATUCK [RIVER] CONNECTICUT BEACH EROSION CONTROL STUDY	5001GR0001	
NA - AREA 7	- HOUSATONIC [RIVER] TO ASH CREEK CONNECTICUT BEACH EROSION CONTROL STUDY	5310GR0004	
NA - AREA 8	- AND 11 SAUGATUCK [RIVER] TO BYRAM RIVER CONNECTICUT BEACH EROSION CONTROL STUDY	5705GR0003	
NA - AREA 2	- HAMMONASSET [RIVER] TO EAST RIVER CONNECTICUT BEACH EROSION CONTROL STUDY	5002GR0001	
NA - AREA 4	- CONNECTICUT [RIVER] TO HAMMONASSET RIVER CONNECTICUT BEACH EROSION CONTROL STUDY	5206GR0001	
NA - SAN-GABRIEL [RIVER] TO NEWPORT-BAY ORANGE COUNTY CALIFORNIA APPENDIX V PHASE II BEACH EROSION CONTROL STUDY		6210GR0002	
NA - AREA 9	- EAST [RIVER] TO NEW-HAVEN HARBOR CONNECTICUT BEACH EROSION CONTROL STUDY	5605GR0002	
NA - THAMES [RIVER] TO NIANTIC-BAY CONNECTICUT BEACH EROSION CONTROL STUDY		5801GR0001	
NA - AREA 5	- PAWCATUCK [RIVER] TO THAMES RIVER CONNECTICUT BEACH EROSION CONTROL STUDY	5212GR0001	
TIMBER IN THE CONSTRUCTION OF SEA DEFENCE AND [RIVER] WORKS		5609GR0002	
ROCKAWAY			
NA - ATLANTIC COAST OF NEW-YORK-CITY FROM EAST ROCKAWAY INLET TO [ROCKAWAY] INLET AND JAMAICA-BAY NEW-YORK		6506GR0001	
NA - ATLANTIC COAST OF NEW-YORK-CITY FROM EAST ROCKAWAY INLET TO [ROCKAWAY] INLET AND JAMAICA-BAY NEW-YORK		6506GR0001	
CONSTRUCTION AND MAINTENANCE OF THE PUBLIC BEACH AT [ROCKAWAY-BEACH] BOROUGH OF QUEENS		3610GR0002	
EFFECTIVENESS OF GROINS AT [ROCKAWAY-BEACH] LONG-ISLAND NEW-YORK		3812GR0001	
ROCKY			
NA - APPENDIX XIV OHIO SHORE LINE OF LAKE-ERIE SHEFFIELD-LAKE-VILLAGE TO [ROCKY] RIVER BEACH EROSION CONTROL STUDY		5304GR0003	
ROUND-TABLE			
[ROUND-TABLE] DISCUSSION		3604GR0001	
[ROUND-TABLE] DISCUSSION OF SHORE PROBLEMS IN RELATION TO RECREATION		3710GR0001	
RUN-UP			
NA - MODEL TESTS OF WAVE [RUN-UP] ON SEA DYKES IN WATT REGION		5400GR0004	
SAND			
BEHAVIOR OF [SAND] ASPHALT GROINS AT OCEAN-CITY MARYLAND		5905GR0001	
THE NEARSHORE MOVEMENT OF [SAND] AT DUBBIN		6207GR0001	
THE BUDD HORIZONTALLY PERMEABLE GROIN SYSTEM FOR BEACH EROSION CONTROL AND REBUILDING [SAND] BEACHES		0000GR0006	
SCALE EFFECTS IN MODELS WITH LITTORAL [SAND] DRIFT		6008GR0001	
NA - SEAGROINS ON COASTS WITH WEAK TIDES AND STRONG [SAND] DRIFT		5100GR0002	
COLORSD SAND TESTS WITH LUMINESCENT [SAND] IN GROIN FIELDS		7000GR0001	
[SAND] MOVEMENT AND BEACH EROSION		3106GR0001	
MOTION OF [SAND] PARTICLES BETWEEN GROINS		5812GR0001	
SEA GROINS EFFECTIVENESS INVESTIGATIONS BY DYED [SAND] TESTS		6600GR0001	
COLORSD [SAND] TESTS WITH LUMINESCENT SAND IN GROIN FIELDS		7000GR0001	
SOME [SAND] TRANSPORT PHENOMENA ON COASTS WITH BARS		7009GR0002	
SUMMARY REPORT ON STUDIES OF [SAND] TRANSPORTATION BY WAVE ACTION		5201GR0001	
A MATHEMATICAL THEORY ABOUT [SAND] WAVES AND ITS APPLICATION ON THE DUTCH WADDEN ISLE OF VLIELAND		6810GR0001	
THE COASTAL DYNAMICS OF [SAND] WAVES AND THE INFLUENCE OF BREAKWATERS AND GROYNES		0000GR0002	
SANDUSKY			
NA - APPENDIX IV OHIO SHORE LINE OF LAKE-ERIE [SANDUSKY] BAY OHIO BEACH EROSION CONTROL STUDY		5304GR0002	
NA - APPENDIX IV OHIO SHORE LINE OF LAKE-ERIE [SANDUSKY] TO VERMILLION OHIO BEACH EROSION CONTROL STUDY		5212GR0002	
SANDWÄNDERUNG			
NA - ÜBER DEN EINFLUSS VON STRANDBÜHNEN AUF DIE [SANDWÄNDERUNG] AN FLACHKUSTEN		6100GR0001	
SANDY			
ARRANGEMENT OF GROINS ON A [SANDY] BEACH		5609GR0001	
TEST WITH SCALE MODELS TO DETERMINE THE EFFECT OF CURRENTS AND BREAKERS UPON A [SANDY] BEACH AND THE ADVANTAGEOUS INSTALLATION OF GROINS		2806GR0001	
SEA DEFENCE EROSION AND PROTECTION ON A [SANDY] COAST		2712GR0001	
LITTORAL PROCESSES ON [SANDY] COASTS		5010GR0002	

SANDY-HOOK	5802GR0002
NA - SHORE OF NEW-JERSEY FROM (SANDY-HOOK) TO BARNEGAT INLET BEACH EROSION CONTROL STUDY	5803GR0001
NA - SHORE OF NEW-JERSEY FROM (SANDY-HOOK) TO BARNEGAT INLET BEACH EROSION CONTROL STUDY	
SANDY-HOOK-BAY	6206GR0003
NA - RARITAN-BAY AND (SANDY-HOOK-BAY) NEW-JERSEY	
SANTA-BARBARA	3803GR0001
NA - BEACH EROSION AT (SANTA-BARBARA) CALIFORNIA	4812GR0006
NA - (SANTA-BARBARA) CALIFORNIA BEACH EROSION CONTROL STUDY	
SANTA-CRUZ	5705GR0004
NA - (SANTA-CRUZ) COUNTY CALIFORNIA BEACH EROSION CONTROL STUDY	
SAN-DIEGO	6009GR0001
NA - (SAN-DIEGO) COUNTY CALIFORNIA APPENDIX IV PHASE 2 BEACH EROSION CONTROL STUDY	
NA - OCEANSIDE OCEAN-BEACH IMPERIAL-BEACH AND CORONADO (SAN-DIEGO) COUNTY CALIFORNIA BEACH EROSION CONTROL STUDY	5605GR0001
NA - SPECIAL STUDY OF CITY OF (SAN-DIEGO) (SUNSET-CLIFFS) CALIFORNIA	6608GR0001
SAN-GABRIEL	6210GR0002
NA - (SAN-GABRIEL) RIVER TO NEWPORT-BAY ORANGE COUNTY CALIFORNIA APPENDIX V PHASE II BEACH EROSION CONTROL STUDY	
SAN-JUAN	6209GR0001
NA - (SAN-JUAN) PUERTO-RICO BEACH EROSION CONTROL STUDY	4812GR0002
NA - PUNTA-LAS-MARIAS (SAN-JUAN) P. R. BEACH EROSION CONTROL STUDY	
SAN-PEDRO	5311GR0002
NA - APPENDIX II COAST OF CALIFORNIA POINT MUGO TO (SAN-PEDRO) BREAKWATER BEACH EROSION CONTROL STUDY	
SARASOTA	6200GR0001
PHOTOGRAPHS OF (SARASOTA) COUNTY FLORIDA SHOWING GROIN INSTALLATION	
SASCO-HILL-BEACH	5705GR0002
PHOTOGRAPHS OF (SASCO-HILL-BEACH) FAIRFIELD CONNECTICUT AFTER GROIN CONSTRUCTION AND BEFORE FILL PLACEMENT	
SAUGATUCK	5001GR0001
NA - AREA I - ASH CREEK TO (SAUGATUCK) RIVER CONNECTICUT BEACH EROSION CONTROL STUDY	5705GR0003
NA - AREAS B AND II (SAUGATUCK) RIVER TO DYHAM RIVER CONNECTICUT BEACH EROSION CONTROL STUDY	
SCALE	6008GR0001
(SCALE) EFFECTS IN MODELS WITH LITTORAL SAND DRIFT	2806GR0001
TEST WITH (SCALE) MODELS TO DETERMINE THE EFFECT OF CURRENTS AND BREAKERS UPON A SANDY BEACH AND THE ADVANTAGEOUS INSTALLATION OF GROINS	
SCATTERED	5009GR0001
(SCATTERED) GROINS	6112GR0001
SCHEME THE SELSEY COAST PROTECTION (SCHEME)	5800GR0002
SCHLESWIG-HOLSTEIN	5200GR0003
NA - SCHUTZ UND ENTWASSERUNG DER NIEDERUNGSGEBIETE AN DER (SCHLESWIG-HOLSTEINISCHEN) OSTSEEKUSTE	5800GR0002
SCHUTZ	3512GR0001
NA - ABRUCH UND (SCHUTZ) DER STEILOEFER AN DER OSTSEEKUSTE	
NA - (SCHUTZ) UND ENTWASSERUNG DER NIEDERUNGSGEBIETE AN DER SCHLESWIG-HOLSTEINISCHEN OSTSEEKUSTE	
SCHUTZBAUTEN	6100GR0002
DIE (SCHUTZBAUTEN) AUF DER INSEL BORKUM	5700GR0012
SCIENTIFIC	
NA - A (SCIENTIFIC) BASIS FOR DESIGN OF GROUPE SYSTEMS	
NA - COASTAL PROTECTION AND (SCIENTIFIC) BASIS OF RESEARCH	
SCOURING	6609GR0001
(SCOURING) DUE TO WAVE ACTION AT THE TOE OF PERMEABLE COASTAL STRUCTURES	
SCREW	3306GR0001
DUO-PLAT-TAYLOR ADJUSTABLE (SCREW) PILE GROUPE	
SEAFORD-BEACH	6300GR0001
NA - AN INVESTIGATION INTO THE EFFECTIVENESS OF VARIOUS TYPES OF GROUPE ON (SEAFORD-BEACH)	
SEAL-BEACH	6010GR0001
DESIGN AND CONSTRUCTION OF THE (SEAL-BEACH) GROIN	

SEAWALL	RECEDING OF SHORELINE AT CUCHIN BY GROYNES AND A (SEAWALL)	5900GR0004
SEA-BED	VARIATION OF TOPOGRAPHY OF (SEA-BED) CAUSED BY THE CONSTRUCTION OF BREAKWATERS	7009GR0007
SEA-WALL	SHORELINE ADVANCEMENT BY (SEA-WALL) AND GROYNES AT CUCHIN	6008GR0003
SEA-WALLS	(SEA-WALLS) AND GROINS OF STEEL SHEETING STABILIZE MIAMI-BEACH CURVED JETTIES (SEA-WALLS) BULKHEADS AND RETAINING WALLS	3105GR0001 4001GR0002
SEDIMENT	FUNCTIONS OF GROINS FUNDAMENTAL STUDY ON BEACH (SEDIMENT) AFFECTED BY GROINS (1)	5700GR0002
SEEGAT	NA - DIE WIRKUNG DER DUNE IM WANDERUNG WEST AUF DIE (SEEGAT)	5200GR0004
SELKIRK-SHORES	NA - (SELKIRK-SHORES) STATE-PARK NEW-YORK BEACH EROSION CONTROL STUDY	5403GR0002
SELSEY	THE (SELSEY) COAST PROTECTION SCHEME	6112GR0001
SEMI-PERMEABLE	PERMEABLE AND (SEMI-PERMEABLE) GROINS FROM OHIO ON LAKE-ERIE	6500GR0003
SHEET	DETORTIONATION OF STEEL (SHEET) PILE GROINS AT PALM-BEACH FLORIDA EXPERIMENTAL STEEL (SHEET) PILE GROINS PALM-BEACH FLORIDA LIFE OF STEEL (SHEET) PILE STRUCTURES IN ATLANTIC COASTAL STATES INVESTIGATIONS OF STEEL (SHEET) PILING STEEL (SHEET) PILING FOR SHORE AND BEACH PROTECTION STRUCTURES DURABILITY OF STEEL (SHEET) PILING IN SHORE STRUCTURES (SHEET) STEEL PILING FOR SHORE PROTECTION STRUCTURES	4910GR0001 4800GR0001 5210GR0002 3607GR0002 4410GR0001 5202GR0001 6210GR0001
SHEETING	SEA-WALLS AND GROINS OF STEEL (SHEETING) STABILIZE MIAMI-BEACH	3105GR0001
SHEFFIELD-LAKE	NA - SHORE OF (SHEFFIELD-LAKE) COMMUNITY PARK OHIO BEACH EROSION CONTROL STUDY	6205GR0001
SHEFFIELD-LAKE-VIL	NA - APPENDIX VIII OHIO SHORE LINE OF LAKE-ERIE BETWEEN VERMILLION AND (SHEFFIELD-LAKE-VILLAGE) BEACH EROSION CONTROL STUDY	5308GR0003
	NA - APPENDIX XIV OHIO SHORE LINE OF LAKE-ERIE (SHEFFIELD-LAKE-VILLAGE) TO ROCKY RIVER BEACH EROSION CONTROL STUDY	5304GR0003
SHINGLE	STABILIZATION OF (SHINGLE) ALLUVIAL SHORES BY GROINS OF FULL PROFILE CHARACTERISTICS OF (SHINGLE) BEACHES: THE SOLUTION TO SOME PRACTICAL PROBLEMS	6400GR0001 7009GR0006
SHOREWOOD	(SHOREWOOD) PROTECTS ITS LAKE FRONT EFFECTIVENESS OF PERMEABLE TYPE GROINS USED FOR BEACH PROTECTION AT (SHOREWOOD) WISCONSIN AND OTHER CITIES ALONG THE WEST SHORE OF LAKE-MICHIGAN	3807GR0004 3911GR0001
SILTING	NA - MODEL INVESTIGATIONS OF HARBOR INLET (SILTING)	5900GR0001
SIZE	EFFECT OF PARTICLE (SIZE) AND DISTRIBUTION ON STABILITY OF ARTIFICIALLY FILLED BEACH PRESQUE-ISLE PENINSULA PENNSYLVANIA	6805GR0001
SOLUTION	CHARACTERISTICS OF SHINGLE BEACHES: THE (SOLUTION) TO SOME PRACTICAL PROBLEMS	7009GR0006
SOUTH	NA - GENERAL COASTAL DYNAMICS AND COASTAL PROTECTION OF THE (SOUTH) BALTIC-SEA BETWEEN TRAVE AND SWINE NA - PROVISIONS FOR STABILIZATION AND MAINTENANCE OF FLOATING ISLANDS OF THE (SOUTH) COAST OF GERMAN NORTH-SEA	5400GR0005 5700GR0004 5002GR0002
SOUTHERN	NA - (SOUTH) SHORE STATE OF RHODE-ISLAND BEACH EROSION CONTROL STUDY	
	NA - COAST OF (SOUTHERN) CALIFORNIA - SPECIAL INTERIM REPORT ON THE VENTURA AREA COOPERATIVE BEACH EROSION CONTROL STUDY	6206GR0002

SOUTH-CAROLINA
NA - HUNTING-ISLAND-BEACH [SOUTH-CAROLINA]
NA - BEACH EROSION AT FOLLY-BEACH [SOUTH-CAROLINA]
SOUTH-KINGSTON
NA - [SOUTH-KINGSTON] AND WESTERLY RHODE-ISLAND BEACH EROSION CONTROL STUDY
SOUTH-LAKE-NORTH
NA - PALM-BEACH COUNTY FROM LAKE-WORTH INLET TO [SOUTH-LAKE-WORTH] INLET FLORIDA BEACH EROSION CONTROL STUDY
NA - PALM-BEACH COUNTY FLORIDA FROM MARTIN COUNTY LINE TO LAKE-WORTH INLET AND FROM [SOUTH-LAKE-WORTH] INLET TO BROWARD COUNTY LINE BEACH EROSION CONTROL STUDY
SPIT
STUDY OF EROSION ALONG HOMER [SPIT] AND VICINITY KACHEMAK-BAY ALASKA
NA - BEACH EROSION AT WILLOUGHBY [SPIT] VIRGINIA
STABILITY
EFFECT OF PARTICLE SIZE AND DISTRIBUTION ON [STABILITY] OF ARTIFICIALLY FILLED BEACH PRESQUE-ISLE PENINSULA PENNSYLVANIA
THE LONGITUDINAL [STABILITY] OF BEACHES
THE ORIGIN AND [STABILITY] OF BEACHES
[STABILITY] OF BEACHES
[STABILITY] OF BEACHES USING GROINS
STABILIZATION
NA - FLOOD PROTECTION AND COAST [STABILIZATION]
NA - FLOOD PROTECTION ON BEACH [STABILIZATION]
THE ACTION OF GROINS ON BEACH [STABILIZATION]
NA - PROVISIONS FOR [STABILIZATION] AND MAINTENANCE OF FLOATING ISLANDS OF THE SOUTH COAST OF GERMAN NORTH-SEA [STABILIZATION] OF SINGLE ALLUVIAL SHORES BY GROINS OF FULL PROFILE
STABILIZE
SEA-WALLS AND GROINS OF STEEL SHEETING [STABILIZE] MIAMI-BEACH
STABILIZED
NA - MODEL TESTS OF BEACH BREAK AT THE END OF [STABILIZED] COASTAL BEACHES LEE-EROSION
STABLE
THE EFFECT OF GROYNES ON [STABLE] BEACHES
STALLED
UNFINISHED BUSINESS NEW-JERSEY GROIN PROJECT [STALLED] BY WINTER
STATE
NA - APPENDIXES V AND X OHIO SHORE LINE OF LAKE-ERIE BETWEEN ASHTABULA AND THE PENNSYLVANIA [STATE] LINE BEACH EROSION CONTROL STUDY
NA - BEACH EROSION STUDY OHIO SHORE LINE OF LAKE-ERIE FROM OHIO - MICHIGAN [STATE] LINE TO MARBLEHEAD OHIO
NA - LAKE-ERIE SHORE LINE FROM THE MICHIGAN - OHIO [STATE] LINE TO MARBLEHEAD OHIO BEACH EROSION CONTROL STUDY
NA - SHORE OF THE [STATE] OF NEW-HAMPSHIRE BEACH EROSION CONTROL STUDY
THE PROTECTION AND PRESERVATION OF THE ATLANTIC SHORE FRONT OF THE [STATE] OF NEW-YORK
NA - SOUTH SHORE [STATE] OF RHODE-ISLAND BEACH EROSION CONTROL STUDY
STATEMENT
SUMMARY [STATEMENT] CONCERNING IMPORTANCE OF A GROIN DESIGN CRITERION
STATEN
NA - [STATEN] ISLAND FORT-HAUSWORTH TO ARTHUR-KILL NEW-YORK BEACH EROSION CONTROL STUDY
STATES
LIFE OF STEEL SHEET PILE STRUCTURES IN ATLANTIC COASTAL [STATES]
STATE-BEACH
AERIAL PHOTOGRAPHS OF WALLIS-SAND [STATE-BEACH] RYE NEW-HAMPSHIRE
STATE-PARK
NA - HAMLIN-BEACH [STATE-PARK] NEW-YORK BEACH EROSION CONTROL STUDY
NA - SELKIRK-SHORES [STATE-PARK] NEW-YORK BEACH EROSION CONTROL STUDY
NA - FAIR-HAVEN-BEACH [STATE-PARK] NEW-YORK BEACH EROSION CONTROL STUDY
STEEL
ALL [STEEL] GROYNES - MIAMI-BEACH
SHEET [STEEL] PILING FOR SHORE PROTECTION STRUCTURES
DETERIORATION OF [STEEL] SHEET PILE GROINS AT PALM-BEACH FLORIDA

STEEL	(CONTINUED)	4800GR0001
EXPERIMENTAL (SHEET PILE GROINS PALM-BEACH FLORIDA		5210GR0002
LIFE OF (STEEL) SHEET PILE STRUCTURES IN ATLANTIC COASTAL STATES		3607GR0002
INVESTIGATIONS OF (STEEL) SHEET PILING		4410GR0001
(STEEL) SHEET PILING FOR SHORE AND BEACH PROTECTION STRUCTURES		5202GR0001
DURABILITY OF (STEEL) SHEET PILING IN SHORE STRUCTURES		3105GR0001
SEA-WALLS AND GROINS OF (STEEL) SHEETING STABILIZE MIAMI-BEACH		
STEEL	NA - (STEEL) SHORE OF BRODTON - CAUSE OF BREAKING ***	5300GR0005
	NA - BEACH ABRASION BY WAVES - REFLECTION ON (STEEL) WALL TYPE OF COASTAL PROTECTIVE STRUCTURES	5500GR0005
STEILUFER	NA - ABHUCH UND SCHUTZ DER (STEILUFER) AN DER OSTSEEKUSTE	5200GR0003
STORM	RECENT (STORM) DAMAGE ALONG THE COASTS OF FLORIDA AND MISSISSIPPI	4801GR0001
	REVIEW OF BEACH EROSION AND (STORM) TIDE CONDITIONS IN FLORIDA 1961-1962	6211GR0001
STRANDRUHNEN	NA - UBER DEN EINFLUSS VON (STRANDRUHNEN) AUF DIE SANDWANDERUNG AN FLACHKUSTEN	6100GR0001
STRUCTURE	NA - ON THE LENGTH AND THE INTERNAL (STRUCTURE) OF SEASHORE GROINS	0000GR0007
STRUCTURES	SHEET STEEL PILING FOR SHORE PROTECTION (STRUCTURES)	6210GR0001
	COASTAL ENGINEERING (STRUCTURES)	6307GR0001
	SCOURING DUE TO WAVE ACTION AT THE TOE OF PERMEABLE COASTAL (STRUCTURES)	6809GR0001
	NA - BEACH ABRASION BY WAVES REFLECTION ON STEEP WALL TYPE OF COASTAL PROTECTIVE (STRUCTURES)	5500GR0005
	A STUDY OF GROINS AND THEIR FUNCTION AS HYDRAULIC (STRUCTURES)	6107GR0001
	ASPHALT IN BEACH EROSION CONTROL (STRUCTURES)	6204GR0003
	DURABILITY OF STEEL SHEET PILING IN SHORE (STRUCTURES)	5202GR0001
	STEEL SHEET PILING FOR SHORE AND BEACH PROTECTION (STRUCTURES)	4410GR0001
	WINDS WAVES AND MARITIME (STRUCTURES)	5000GR0001
	CONCRETE SHORE PROTECTION (STRUCTURES)	4410GR0003
	A PICTORIAL HISTORY OF SELECTED (STRUCTURES) ALONG THE NEW-JERSEY COAST	6410GR0001
	NA - SWELL AND SURGE AS BASIS FOR PLANNING AND DESIGN IN SEA (STRUCTURES) AND COASTAL PROTECTION	5800GR0007
	(STRUCTURES) FOR SHORE PROTECTION	6307GR0003
	NA - SEA TRANSPORTATION (STRUCTURES) III-8	4900GR0008
	LIFE OF STEEL SHEET PILE (STRUCTURES) IN ATLANTIC COASTAL STATES	5210GR0002
	NA - THE EFFECT OF ISLAND PROTECTIVE (STRUCTURES) ON BEACH DEVELOPMENT IN WEST PART OF NORDERNEY	5500GR0008
	NA - EFFECTS OF COASTAL PROTECTIVE (STRUCTURES) ON SILT	5700GR0011
	EFFECTS OF LARGE (STRUCTURES) ON THE OHIO SHORE OF LAKE-ERIE	6400GR0002
	NA - THEORETICAL OBSERVATIONS FOR INSTALLATION OF COASTAL PROTECTIVE (STRUCTURES) ON TIDELESS SHORES	5300GR0002
	NA - HYDRAULIC (STRUCTURES) (GROINS DAMS DYKES AND CANAL EMBANKMENTS) OF BITUMEN TYPE	5300GR0004
STUDIES		
	BEACH EROSION (STUDIES)	3901GR0001
	BEACH EROSION (STUDIES)	4000GR0001
	BEACH EROSION (STUDIES)	4000GR0002
	LAKE-MICHIGAN EROSION (STUDIES)	5300GR0001
	REPORT ON ST-SIMON ISLAND (STUDIES)	4101GR0001
	COAST EROSION AND PROTECTION - (STUDIES) IN CAUSES AND REMEDIES	5200GR0002
	MODEL (STUDIES) IN-SITU OBSERVATIONS	7000GR0003
	SUMMARY REPORT ON (STUDIES) OF SAND TRANSPORTATION BY WAVE ACTION	5201GR0001
STUDY		
	COASTAL ENGINEERING (STUDY) AT POMPAHO-BEACH	5903GR0002
	NA - BEACH EROSION (STUDY) CORONADO CALIFORNIA	4202GR0001
	NA - BEACH EROSION (STUDY) LAKE-ERIE SHORE LINE IN THE VICINITY OF HURON OHIO	4505GR0001
	NA - BEACH EROSION (STUDY) LAKE-MICHIGAN SHORE LINE OF MILWAUKEE COUNTY WISCONSIN	4604GR0001
	NA - (STUDY) OF AN ARTIFICIAL BATHING BEACH AT ORCHARD-BEACH PELHAM-BAY NEW-YORK	3711GR0002
	NA - BEACH EROSION (STUDY) OF BAKERS-HAULOVER INLET FLORIDA	4604GR0002
	NA - SPECIAL (STUDY) OF CITY OF SAN-DIEGO (SUNSET-CLIFFS) CALIFORNIA	6608GR0001

STUDY	(CONTINUED)	5511GR0001
	(STUDY) OF EROSION ALONG HUMER SPIT AND VICINITY KACHEMAK-BAY ALASKA	5107GR0001
	A (STUDY) OF GROINS AND THEIR FUNCTION AS HYDRAULIC STRUCTURES	6206GR0001
	A MODEL (STUDY) OF THE BEHAVIOR OF BEACHES AND GROYNES	
	LABORATORY (STUDY) OF THE EFFECT OF GROINS ON THE RATE OF LITTORAL TRANSPORT EQUIPMENT DEVELOPMENT AND INITIAL TESTS	5906GR0001
	EXPERIMENTAL (STUDY) OF THE HYDRAULIC BEHAVIOR OF GROYNES SYSTEMS	6809GR0003
	EXPERIMENTAL (STUDY) OF THE HYDRAULIC BEHAVIOR OF INCLINED GROYNES SYSTEMS	7009GR0003
	NA - BEACH EROSION CONTROL REPORT ON COOPERATIVE (STUDY) OF VIRGINIA AND BISCAYNE KEYS FLORIDA	6209GR0004
	NA - BEACH EROSION (STUDY) OHIO SHORE LINE OF LAKE-ERIE FROM OHIO - MICHIGAN STATE LINE TO MARBLEHEAD OHIO	4505GR0002
	FUNCTIONS OF GROINS FUNDAMENTAL (STUDY) ON BEACH SEDIMENT AFFECTED BY GROINS (I)	5700GR0002
	AN EXPERIMENTAL (STUDY) ON THE EFFECT OF COASTAL GROINS	5810GR0001
	NA - BEACH EROSION (STUDY) ORANGE COUNTY CALIFORNIA	4002GR0001
	NA - BEACH EROSION CONTROL (STUDY) ST. JOHNS COUNTY FLORIDA	6607GR0001
	NA - BEACH EROSION (STUDY) ST. SIMON ISLAND GEORGIA	4010GR0002
ST. AUGUSTINE	SHORE EROSION AND CABBAGE PALMETTO GROINS AT NORTH POINT (ST. AUGUSTINE) FLORIDA	3811GR0001
	EROSION AND PALMETTO GROINS AT NORTH POINT (ST. AUGUSTINE) FLORIDA	3912GR0001
ST. JOHNS	NA - BEACH EROSION CONTROL STUDY (ST. JOHNS) COUNTY FLORIDA	6607GR0001
ST. SIMON	NA - BEACH EROSION STUDY (ST. SIMON) ISLAND GEORGIA	4010GR0002
	REPORT ON (ST. SIMON) ISLAND STUDIES	4101GR0001
SUITABILITY	(SUMMARY) OF MODEL TESTS IN MARITIME ENGINEERING IN HARBORS SEAWAYS AND COASTAL PROTECTION	5600GR0006
SUMMARY	(SUMMARY) REPORT ON STUDIES OF SAND TRANSPORTATION BY WAVE ACTION	5201GR0001
SUNSET-CLIFFS	(SUMMARY) STATEMENT CONCERNING IMPORTANCE OF A GROIN DESIGN CRITERION	5810GR0002
	NA - SPECIAL STUDY OF CITY OF SAN-DIEGO (SUNSET-CLIFFS) CALIFORNIA	6608GR0001
SURGE	NA - (SURGE) AND SHORE CHANGES ON THE WEST COAST OF SYLT	5500GR0007
	NA - SWELL AND (SURGE) AS BASIS FOR PLANNING AND DESIGN IN SEA STRUCTURES AND COASTAL PROTECTION	5800GR0007
SWELL	NA - (SWELL) AND SURGE AS BASIS FOR PLANNING AND DESIGN IN SEA STRUCTURES AND COASTAL PROTECTION	5800GR0007
SYLT	NA - PROTECTION OF THE WEST BEACH OF (SYLT) ISLAND BY FLAT GROINS	6000GR0002
	INFLUENCE OF PROTECTIVE WORKS ON THE EROSION OF THE WEST COAST OF (SYLT) NORTH-SEA COAST OF GERMANY	0000GR0003
SYSTEM	THE DYNAMICS OF A COAST WITH A GROYNES (SYSTEM)	6809GR0001
	THE DYNAMICS OF A COAST WITH A GROYNES (SYSTEM)	7009GR0008
	FILLING PATTERN OF THE FORT-SHEKIDAN GROIN (SYSTEM)	5310GR0003
	THE BUDD HORIZONTALLY PERMEABLE GROIN (SYSTEM) FOR BEACH EROSION CONTROL AND REBUILDING SAND BEACHES	0000GR0006
SYSTEMS	EXPERIMENTAL STUDY OF THE HYDRAULIC BEHAVIOR OF INCLINED GROYNES (SYSTEMS)	7009GR0003
	EXPERIMENTAL STUDY OF THE HYDRAULIC BEHAVIOR OF GROYNES (SYSTEMS)	6809GR0003
	COAST PROTECTION - GROYNES (SYSTEMS)	6204GR0004
	NA - A SCIENTIFIC BASIS FOR DESIGN OF GROYNES (SYSTEMS)	6100GR0002
TERMINAL	THE (TERMINAL) PROBLEM IN COAST PROTECTION	6809GR0005
TEST	(TEST) WITH SCALE MODELS TO DETERMINE THE EFFECT OF CURRENTS AND BREAKERS UPON A SANDY BEACH AND THE ADVANTAGEOUS INSTALLATION OF GROINS	2806GR0001
TESTS	NA - SUITABILITY OF MODEL (TESTS) IN MARITIME ENGINEERING IN HARBORS SEAWAYS AND COASTAL PROTECTION	5600GR0006
	NA - MODEL (TESTS) OF BEACH BREAK AT THE END OF STABILIZED COASTAL BEACHES LEE-EROSION	0000GR0004
	NA - SOME IDEAS ON THE PROBLEM OF RESEARCH IN COASTAL DYNAMICS AND MODEL (TESTS) OF COASTAL PROTECTION	5600GR0001

TESTS (CONTINUED)

NA - MODEL (TESTS) OF WAVE RUN-UP ON SEA DYKES IN WATT REGION
 COLORED SAND (TESTS) WITH LUMINESCENT SAND IN GROIN FIELDS
 NA - MODEL (TESTS) WITH MOVEABLE FLOUR IN SEA AND SEA HARBOR CONSTRUCTION
 TEXAS NA - GULF SHORE OF GALVESTON ISLAND (TEXAS) BEACH EROSION CONTROL STUDY

THAMES NA - AREA 5 PAMCATUCK RIVER TO (THAMES) RIVER CONNECTICUT BEACH EROSION CONTROL STUDY
 NA - (THAMES) RIVER TO MANITOWOC BAY CONNECTICUT BEACH EROSION CONTROL STUDY

THEORETICAL NA - (THEORETICAL) OBSERVATIONS FOR INSTALLATION OF COASTAL PROTECTIVE STRUCTURES ON TIDELESS SHORES

THEORY A MATHEMATICAL (THEORY) ABOUT SAND WAVES AND ITS APPLICATION ON THE DUTCH WADDEN ISLE OF VLIELAND

TIDAL THE PROTECTION AND IMPROVEMENT OF FORESHORES BY THE UTILIZATION OF (TIDAL) AND WAVE ACTION
 LAND RECLAMATION AND GROIN-BUILDING IN THE (TIDAL) FLATS

TIDE REVIEW OF BEACH EROSION AND STORM (TIDE) CONDITIONS IN FLORIDA 1961-1962

TIDELESS NA - THEORETICAL OBSERVATIONS FOR INSTALLATION OF COASTAL PROTECTIVE STRUCTURES ON (TIDELESS) SHORES

TIDES NA - SEAGROINS ON COASTS WITH WEAK (TIDES) AND STRONG SAND DRIFT

TILGHMAN REPORT ON SHORE EROSION AT (TILGHMAN) POINT MARYLAND

TIMBER (TIMBER) IN THE CONSTRUCTION OF SEA DEFENCE AND RIVER WORKS

TOPOGRAPHY VARIATION OF (TOPOGRAPHY) OF SEA-BED CAUSED BY THE CONSTRUCTION OF BREAKWATERS

TRANSPORT LABORATORY STUDY OF THE EFFECT OF GROINS ON THE RATE OF LITTORAL (TRANSPORT) EQUIPMENT DEVELOPMENT AND INITIAL TESTS

TRANSPORTATION SOME SAND (TRANSPORT) PHENOMENA ON COASTS WITH BARS
 SUMMARY REPORT ON STUDIES OF SAND (TRANSPORTATION) BY WAVE ACTION
 NA - SEA (TRANSPORTATION) STRUCTURES III-B

TRAVE NA - GENERAL COASTAL DYNAMICS AND COASTAL PROTECTION OF THE SOUTH BALTIC-SEA BETWEEN (TRAVE) AND SWINE

TRAVEL OBSERVATIONS ON THE (TRAVEL) OF SHORE MATERIAL ALONG A CHALK FORESHORE

TRISCHEN NA - ORIGIN AND DECLINE OF THE ISLAND (TRISCHEN)

TWO-RIVERS NA - MANITOWOC COUNTY FROM (TWO-RIVERS) TO MANITOWOC WISCONSIN BEACH EROSION CONTROL STUDY

UFERVERANDERUNGEN NA - (UFERVERANDERUNGEN) UND KUSTENSCHUTZ AUF SYLT

UNDERWATER NA - (UNDERWATER) LONGITUDINAL WORKS FOR COASTAL PROTECTION

UNFINISHED (UNFINISHED) BUSINESS NEW-JERSEY GROIN PROJECT STALLED BY WINTER

UNITED-STATES SHORE PROTECTION EXPERIENCE IN THE (UNITED-STATES)

UNTERSUCHUNGEN NA - GUTACHTLICHE STELLUNGNAHME ZU DEN (UNTERSUCHUNGEN) UBER DIE URSACHEN DER ABRUCHSERSCHENUNGEN AM WEST UND NORD WESTSTRAND DER INSEL NORD-RENEY

NA - FOLGERUNGEN AUS (UNTERSUCHUNGEN) UBER KUSTENSCHUTZPROBLEME AUF SYLT

URSACHEN	- GUTACHTLICHE STELLUNGNAHME ZU DEN UNTERSUCHUNGEN UBER DIE [URSACHEN] DER ABRUCHSERSCHINUNGEN AM WEST UND	5200GR0006
NA	NORD WESTSTRAND DER INSEL NORDERNEY	5200GR0005
NA	- DIE [URSACHEN] DER ABRUCHSERSCHINUNGEN AN WEST UND NORDWESTSTRAND DER INSEL NORDERNEY	
VARIATION	[VARIATIONS] IN TOPOGRAPHY OF SEA-BED CAUSED BY THE CONSTRUCTION OF BREAKWATERS	7009GR0007
VARIATIONS	[VARIATIONS] IN GRUIN DESIGN	6705GR0001
[VARIATIONS]	[VARIATIONS] IN GRUIN DESIGN	6510GR0001
VENTURA	NA - COAST OF SOUTHERN CALIFORNIA - SPECIAL INTERIM REPORT ON THE [VENTURA] AREA COOPERATIVE BEACH EROSION CONTROL STUDY	6206GR0002
VERMILLION	NA - APPENDIX VIII OHIO SHORE LINE OF LAKE-ERIE BETWEEN [VERMILLION] AND SHEFFIELD-LAKE-VILLAGE BEACH EROSION CONTROL STUDY	5308GR0003
VERSUS	NA - APPENDIX IV OHIO SHORE LINE OF LAKE-ERIE SANDUSKY TO [VERMILLION] OHIO BEACH EROSION CONTROL STUDY	5212GR0002
VICINITY	THE NORTH SHORE [VERSUS] LAKE-MICHIGAN	3011GR0001
STUDY	STUDY OF EROSION ALONG HOWER SPIT AND [VICINITY] KACHEMAK-BAY ALASKA	6511GR0001
NA	- FORT-MACON - ATLANTIC-BEACH AND [VICINITY] NORTH-CAROLINA	6209GR0002
NA	- CAROLINA-BEACH AND [VICINITY] NORTH-CAROLINA	6205GR0002
NA	- ON THE FLOW CHARACTERISTICS IN THE [VICINITY] OF GROINS	5511GR0004
NA	- BEACH EROSION STUDY LAKE-ERIE SHORE LINE IN THE [VICINITY] OF HURON OHIO	4505GR0001
VIRGINIA	NA - BEACH EROSION AT WILLIAMS SPIT [VIRGINIA]	3801GR0003
NA	- BEACH EROSION CONTROL REPORT ON COOPERATIVE STUDY OF [VIRGINIA] AND BISCAYNE KEYS FLORIDA	6209GR0004
NA	- VIRGINIA-BEACH [VIRGINIA] BEACH EROSION CONTROL STUDY	5306GR0004
NA	- COLONIAL-BEACH [VIRGINIA] BEACH EROSION CONTROL STUDY	4909GR0001
NA	- VIRGINIA-BEACH [VIRGINIA] COOPERATIVE BEACH EROSION CONTROL STUDY	6204GR0005
VIRGINIA-BEACH	NA - [VIRGINIA-BEACH] VIRGINIA BEACH EROSION CONTROL STUDY	5306GR0004
NA	- [VIRGINIA-BEACH] VIRGINIA COOPERATIVE BEACH EROSION CONTROL STUDY	6204GR0005
VLIELAND	NA - A MATHEMATICAL THEORY ABOUT SAND WAVES AND ITS APPLICATION ON THE DUTCH WADDEN ISLE OF [VLIELAND]	6810GR0001
WADDEN	A MATHEMATICAL THEORY ABOUT SAND WAVES AND ITS APPLICATION ON THE DUTCH [WADDEN] ISLE OF VLIELAND	6810GR0001
WAIKIKI-BEACH	NA - [WAIKIKI-BEACH] ISLAND OF OAHU I. H. BEACH EROSION CONTROL STUDY	5308GR0001
NA	- [WAIKIKI-BEACH] OAHU HAWAII BEACH EROSION CONTROL STUDY	6503GR0003
WAIKIKI-BEACH	NA - [WAIKIKI-BEACH] OAHU HAWAII BEACH EROSION CONTROL STUDY	
WALL	NA - [WALL-BEACH] AND HANAPEPE-BAY ISLAND OF KAUAI I. H. BEACH EROSION CONTROL STUDY	5606GR0001
WALLS-SAND	NA - BEACH ABRASION BY WAVES - REFLECTION ON STEEP [WALL] TYPE OF COASTAL PROTECTIVE STRUCTURES	5500GR0005
WANGERDUGE	AERIAL PHOTOGRAPHS OF [WALLS-SAND] STATE-BEACH RYE NEW-HAMPSHIRE	6306GR0001
WATER	NA - DIE WINKUNG DER SONNE H IN [WANGERDUGE] WEST AUF DIE SEEGAT	5200GR0004
NA	- MANUAL OF [WATER] ECONOMY	5800GR0006
NA	- [WATER] ECONOMY BETWEEN NORTH AND BALTIC-SEA KIEL	5100GR0001
NA	- [WATER] ECONOMY BETWEEN NORTH-SEA AND BALTIC-SEA 1944-58	5800GR0005
NA	- WHAT [WATER] ECONOMY IMPLIES FOR COASTAL RESEARCH	5500GR0004
WATT	NA - MODEL TESTS OF WAVE RUN-UP ON SEA DYKES IN [WATT] REGION	5400GR0004
WAVE	SUMMARY REPORT ON STUDIES OF SAND TRANSPORTATION BY [WAVE] ACTION	5201GR0001

WAVE (CONTINUED)
THE PROTECTION AND IMPROVEMENT OF FORESHORES BY THE UTILIZATION OF TIDAL AND (WAVE) ACTION
SCOURING DUE TO (WAVE) ACTION AT THE TOE OF PERMEABLE COASTAL STRUCTURES
(WAVE) ACTION ON BEACHES
NA - MODEL TESTS OF (WAVE) RUN-UP ON SEA DYKES IN WADI REGION

WAVES
THE RELATION OF THE ACTION OF (WAVES) AND CURRENTS ON HEADLANDS TO THE CONTROL OF SHORE EROSION BY GROINS
A MATHEMATICAL THEORY ABOUT SAND (WAVES) AND ITS APPLICATION ON THE DUTCH WADDEN ISLE OF VLIELAND
WINDS (WAVES) AND MARITIME STRUCTURES
THE COASTAL DYNAMICS OF SAND (WAVES) AND THE INFLUENCE OF BREAKWATERS AND GROYNES
NA - BEACH ABRASION BY (WAVES) - REFLECTION ON STEEP WALL TYPE OF COASTAL PROTECTIVE STRUCTURES
WESSAGUSSETT-BEACH
NA - [WESSAGUSSETT-BEACH] WYOMOUTH MASSACHUSETTS

WEST
NA - DIE PROTEKTION DER BUHNE H IN VANGERDUGGE [WEST] AUF DIE SEEGAT
NA - PROTECTION OF THE [WEST] BEACH OF SYLT ISLAND BY FLAT GROINS
NA - SURGE AND SHORE CHANGES ON THE [WEST] COAST OF SYLT
INFLUENCE OF PROTECTIVE WORKS ON THE EROSION OF THE [WEST] COAST OF SYLT NORTH-SEA COAST OF GERMANY
NA - THE EFFECT OF ISLAND PROTECTIVE STRUCTURES ON BEACH DEVELOPMENT IN [WEST] PART OF NORDERNEY
EFFECTIVENESS OF PERMEABLE TYPE GROINS USED FOR BEACH PROTECTION AT SHOREWOOD WISCONSIN AND OTHER CITIES ALONG THE [WEST] SHORE OF LAKE-MICHIGAN
NA - GUTACHTLICHE STELLUNGNAHME ZU DEN UNTERSUCHUNGEN UBER DIE URSACHEN DER ABRUCHSERSCHINUNGEN AM [WEST] UND NORD-UND WESTSTRAND DER INSEL NORDERNEY

WESTCOAST
THE DANISH [WESTCOAST] - LITTORAL UPLIFT PROBLEMS AND MEASURES AGAINST COAST EROSION

WESTERLY
NA - [WESTERLY] RHODE-ISLAND
NA - SOUTH-KINGSTON AND [WESTERLY] RHODE-ISLAND BEACH EROSION CONTROL STUDY
NA - ATLANTIC COAST OF LONG-ISLAND FIRE-ISLAND INLET AND SHORE [WESTERLY] TO JONES INLET NEW-YORK

WESTPORT
NA - BEACH EROSION AT COMPO-BEACH [WESTPORT] CONNECTICUT
PHOTOGRAPHS OF COMPO-BEACH [WESTPORT] CONNECTICUT AFTER GROIN CONSTRUCTION AND BEFORE FILL PLACEMENT

WESTSTRAND
NA - GUTACHTLICHE STELLUNGNAHME ZU DEN UNTERSUCHUNGEN UBER DIE URSACHEN DER ABRUCHSERSCHINUNGEN AM WEST UND NORD [WESTSTRAND] DER INSEL NORDERNEY

WEST-HAVEN
BEHAVIOR OF BEACH FILL AND BORROW AREA AT PROSPECT-BEACH [WEST-HAVEN] CONNECTICUT

WEYMOUTH
NA - WESSAGUSSETT-BEACH [WEYMOUTH] MASSACHUSETTS

WILLOUGHBY
NA - BEACH EROSION AT [WILLOUGHBY] SPIIT VIRGINIA

WINDS [WINDS] WAVES AND MARITIME STRUCTURES

WINTER
UNFINISHED BUSINESS NEW-JERSEY GROIN PROJECT STALLED BY [WINTER]

WINTHROP
SHORE PROTECTIVE WORK AT [WINTHROP] MASSACHUSETTS
SHORE PROTECTIVE WORK AT [WINTHROP] MASSACHUSETTS

WINTHROP-BEACH
NA - [WINTHROP-BEACH] MASSACHUSETTS BEACH EROSION CONTROL STUDY

WISCONSIN
PERMEABLE GROINS AT KENOSHA [WISCONSIN]
NA - BEACH EROSION STUDY LAKE-MICHIGAN SHORE LINE OF MILWAUKEE COUNTY [WISCONSIN]
EFFECTIVENESS OF PERMEABLE TYPE GROINS USED FOR BEACH PROTECTION AT SHOREWOOD [WISCONSIN] AND OTHER CITIES ALONG THE WEST SHORE OF LAKE-MICHIGAN
NA - MANITOWOC COUNTY FROM TWO-RIVERS TO MANITOWOC [WISCONSIN] BEACH EROSION CONTROL STUDY

WISCONSIN	(CONTINUED)				5509GR0002
NA - CITY OF KENOSHA [WISCONSIN] BEACH EROSION CONTROL STUDY					5302GR0001
NA - RACINE COUNTY [WISCONSIN] BEACH EROSION CONTROL STUDY					6500GR0001
NA - GROINS FROM [WISCONSIN] ON LAKE-MICHIGAN					
WORK					
	SHORE PROTECTIVE [WORK] AT WINTHROP MASSACHUSETTS				3807GR0003
	SHORE PROTECTIVE [WORK] AT WINTHROP MASSACHUSETTS				3806GR0001
WORKS					
	PAPER ON PROTECTIVE [WORKS] ADAPTED TO LIMIT EROSION ALONG THE OPEN COAST HOW THEY WORK				4806GR0001
	COASTAL PROTECTION [WORKS] AND RELATED PROBLEMS IN JAPAN				6008GR0004
	NEW COASTAL [WORKS] AT NAKAKIYA (ISRAEL)				6502GR0001
	NEW - UNDERWATER LONGITUDINAL [WORKS] FOR COASTAL PROTECTION				5200GR0001
	SOME SEA DEFENCE [WORKS] FOR RECLAIMED LANDS				4602GR0001
	CONSTRUCTION [WORKS] FOR THE PROTECTION OF THE COASTS				6300GR0002
	BEACH EROSION AND PROTECTION [WORKS] IN IMAZU-SAKANO-BEACH				6112GR0002
	NA - ORIGIN AND DEVELOPMENT OF ISLAND PROTECTIVE [WORKS] ON NORDERNEY				5800GR0003
	NA - DUNE PROTECTIVE [WORKS] ON SYLT				5306GR0001
	COAST PROTECTION SOME RECENT [WORKS] ON THE EAST COAST 1942-52				0000GR0003
	INFLUENCE OF PROTECTIVE [WORKS] ON THE EROSION OF THE WEST COAST OF SYLT NORTH-SEA COAST OF GERMANY				5701GR0001
	PROTECTION [WORKS] ON THE MEXICAN COAST THE CREATION OF BEACHES AND DUNES				6705GR0002
	NA - SEA DEFENCE [WORKS] - GROINS AND REVELMENTS				0000GR0005
MOSEVITZ					
	THE [MOSEVITZ] PRECAST PERMEABLE GROIN				4010GR0001
WRIGHTSVILLE	WRIGHTSVILLE-BEACH				3401GR0001
	EROSION CONTROL AT [WRIGHTSVILLE-BEACH]				
	NA - [WRIGHTSVILLE-BEACH] NORTH-CAROLINA				
YEAR					
	ASPHALT GROINS - TWO [YEAR] PLAN				5708GR0001
15TH					
	REPORT TO THE [15TH] INTERNATIONAL NAVIGATION CONGRESS				3100GR0001
	REPORT TO THE [15TH] INTERNATIONAL NAVIGATION CONGRESS				3100GR0002
17TH					
	REPORT TO THE [17TH] INTERNATIONAL NAVIGATION CONGRESS				4900GR0005
	NA - REPORT TO THE [17TH] INTERNATIONAL NAVIGATION CONGRESS				4900GR0002
	REPORT TO THE [17TH] INTERNATIONAL NAVIGATION CONGRESS				4900GR0003
	REPORT TO THE [17TH] INTERNATIONAL NAVIGATION CONGRESS				4900GR0001
	NA - REPORT TO THE [17TH] INTERNATIONAL NAVIGATION CONGRESS				4900GR0007
	REPORT TO THE [17TH] INTERNATIONAL NAVIGATION CONGRESS				4900GR0004
	NA - REPORT TO THE [17TH] INTERNATIONAL NAVIGATION CONGRESS				4900GR0006
18TH					
	REPORT TO THE [18TH] INTERNATIONAL NAVIGATION CONGRESS				5300GR0003
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13. ABSTRACT <p>A groin is a shore protective structure built (usually perpendicular to the shore) to trap sedimentary material or to retard erosion of the shore. Of all the shore protective structures used by coastal engineers, the groin is the most difficult to design - functionally and structurally. Because this complexity of design was not recognized until recently, many early groin installations were failures. CERC supports a continuing research program devoted to gaining a better understanding of groins. This bibliography evolved from the groin research program.</p> <p>About 460 articles published since 1900 on groins and groin-type structures are presented in this bibliography. Annotations accompany each bibliographic entry where possible. Indexes of authors, titles, and subjects are included to aid the researcher. Unavailable literature such as foreign articles, although not annotated, are included as entries in both the annotated section and the indexes.</p>			

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